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Pit and Quarry

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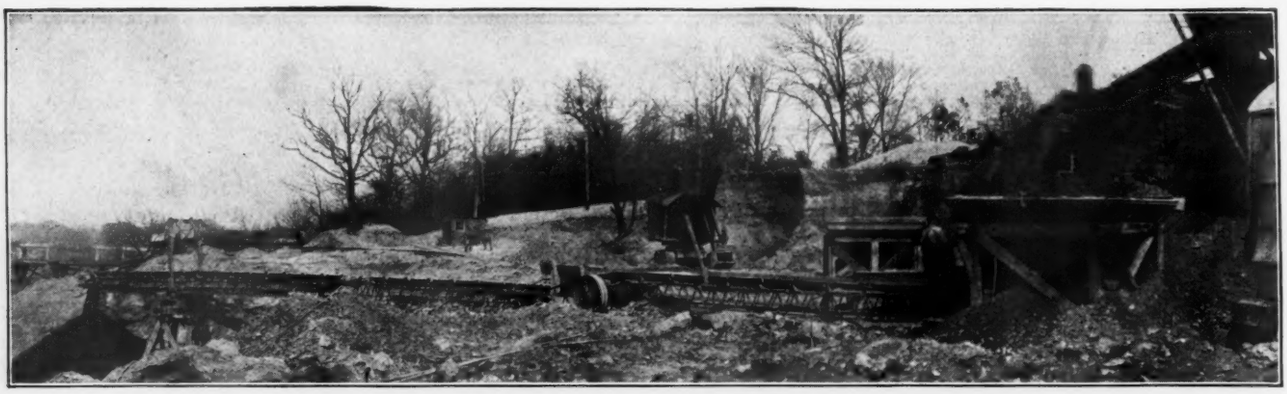

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Pit and Quarry

Vol. 12 CHICAGO, ILL., SEPTEMBER 1, 1926 No. 11

RULES OF THE GAME

AMERICAN life is closely associated with sports. Any group of business men finds itself on common ground when the subject of a major sport comes up for discussion. Out of this universal interest in games has come the word sportsmanship which has acquired almost a magic connotation or personality. Good sportsmanship speaks for itself. It decrees that men of fine feeling shall take no unfair advantage of an opponent in any of the contests of life. It suggests equity, fair play, generous cooperation, and integrity in games, in social relationships and in business. It is the modern interpretation and application of that spirit of chivalry which throws a glow over the middle ages. It cannot be acquired by statute, but must be created and enriched by men of high ideals and vision. It is as necessary in business activity as in the field of sports. It establishes a feeling of confidence without which a project is doomed to disaster. To attempt to carry on a business successfully and to be governed by selfish, crafty, unscrupulous principles are incompatible conditions. Selfishness and fair play are qualities which cannot function harmoniously; crafty dealing and cooperation can never go hand in hand, unscrupulous methods and integrity clash at every turn. The business man whose operations are based on principles which violate the laws of sportsmanship will find success to be short lived and unavailing.

The same rules which are recognized as dominant in the field of sports are essential to a prosperous business. There must be rules of the game, whether the game is baseball, business, or friendship; and those rules must be steady and unchanging. The laws of the universe are certain and sure; they play no tricks. The laws of sportsmanship must be just as unwavering. It would be a hopeless world if each morning we were forced to wonder what laws would function on that particular day. It is a chaotic business which operates on unstable, fluctuating ethical principles. If the executive does not adhere to the laws of good sportsmanship, the situation is hopeless for the employees. If the employees do not recognize obligations on their part, it is a fruitless enterprise for the leader. If competitors are not dominated by motives of good sportsmanship, there is no possibility of confidence and good will. Only by well established dealings which are characterized by integrity and fair play can the rules of the game be maintained. And there must be rules of the game.

There must be an umpire in a game; there must be an umpire in business. That umpire will not be a man, or a group, or a court. It will be a committee of the whole, with a common heritage of a sportsman-like regard for the game of life and of business. The umpire of business will demand conduct which proceeds from good will, a sure sense of propriety, and self control equal to any emergency. Such an umpire will seek for the best in business and will preserve high standards of sportsmanship. It is impossible to maintain two sets of ideals; one for social relations, and one for business. An inevitable law of compensation works in business enterprises. High pressure methods, dominance, and concealed blows at opponents do not bring ultimate or lasting advantage. Profits will in the end be proportionate to service. Temporary success with questionable methods gives way in time to the will of the umpire, the committee of the whole, the ethical standards of the entire group. That umpire holds the power to sanction the play or to call a foul. His decision is sharp and final; it is fair and just. To such an umpire every member of the group must submit his actions; he must become one of the committee of the whole.

The chief rule of this game of business is the square deal, consideration for the other fellow. Good sportsmanship crystallizes some of the fundamental principles of the ethics of all religions. The essence of the golden rule and of the teachings of the greatest leaders of groups inspired with high ideals can be found in the homely term, a square deal. Business relationships reveal many types of individuals. There is the man who grasps only his side of the story, who interprets a square deal as one which brings gain to him. Then there is the man who is willing to do a good turn even if he can see no immediate gain for himself. He gets a certain pleasure out of a generous action; he enjoys participating in a square deal. Each man acts consistently with his nature. The first one would experience discomfort from generosity; the second, from petty or selfish behavior. Perhaps neither one deserves blame or

credit for following out a law of his being. Perhaps good sportsmanship like a good disposition or pleasing personality is a part of the equipment a man brings into this existence. In a certain tennis match one of the players served a ball very close to the line. The umpire called it out when in reality it was not out. When the next ball was served, the opponent made no effort to return it. The crowd, of course, cheered a generous act. The crowd always recognizes a square deal. The player followed a law of his nature which would control his action on a tennis court, at a card game, or in a business transaction.

Good sportsmanship requires tenacity, the stanch quality of sticking to a thing. A player can never quit when the score is against him; he can never "lie down on the job." Of course, there is no more vital rule for business than this one of holding on. It is the crucial rule for the employee, for the executive, and for the competitor. Go through to the finish. Many of the great leaders in industry today have been counted out by the onlookers; but they were not out. They were not defeated because they did not accept defeat. The determining factor in success is the will to succeed. A grim refusal to fail has carried many an executive through places so hazardous that most prophets would have foreseen failure. A good sportsman does not quit. Even when he is apparently beaten, when he sees only a wall ahead, he begins to figure on the best way to scale the wall.

Keeping fit is an important rule of sportsmanship. It is a breach of ethics to break training. A player must be in perfect physical condition to be eligible. If a similar attitude toward health could be secured in business, the results would be significant. If it could be considered poor sportsmanship to violate well-known laws governing physical fitness, everyone concerned with business would profit. Many of the other rules of the game are ultimately dependable on health. Tenacity is more easily developed through the vigor of good health. Possibly the seemingly selfish or unscrupulous act is motivated by ill health rather than by poor sportsmanship. Loss due to poor health has been estimated and runs into unbelievably high figures. Along with physical fitness go buoyancy and optimism, both necessary to real achievement. In most cases a man's physical fitness rests with himself. He would follow the instructions of the coach if he were preparing for an athletic contest. He would severely censure any member of a contesting team who proved lax in this matter of health. Yet with the far more important contest of business he trifles with one of the most important elements in the success or failure of his undertaking.

PRODUCTIVE EFFICIENCY INCREASES WITH SIZE

ANALYTICAL study of comparative productivity of plants of varying sizes has been made by the National Industrial Conference Board. The statistics cover conditions during the years 1919-1923. During this period medium sized plants with an annual output ranging from $20,000 to $500,000 have increased their labor utilization efficiency more than have the larger or smaller plants. It is generally true, however, that the large scale industry is the most efficient in the utilization of labor. Production per worker in 1923 in plants with an annual output of $1,000,000 and up was $1,481 for every $1,000 produced per capita by workers in all plants with less than $1,000,000 annual output. The per capita output of the larger plants was, therefore, 48.1 per cent greater than the per capita production of all smaller plants combined. In 1919, the per capita production of workers in larger plants was $1,590 for every $1,000 produced per worker in the smaller plants. In 1919, plants with an output of from $100,000 to $500,000 produced $717 worth per worker for every $1,000 produced per worker in all other plants; in 1923, they produced $762 worth per worker for every $1,000 produced per worker in all other plants. This shows an increase of 6.3 per cent.

Of the large plants those with an annual output of from $500,000 to $1,000,000 show an increase in production per capita. In 1919, their production per worker was $825 worth for every $1,000 produced per worker in all other plants; in 1923, the production per worker was $845. This gives an increase of 2.4 per cent. Plants with an annual output of $20,000 to $100,000 increased from $633 in 1919 to $673 in 1923 for every $1,000 of per capita production of workers in all other plants. This is an increase of 6.3 per cent. Plants under $20,000 production per year showed a decrease of 3.1 per cent.

Large scale industry, therefore, proves to be the most efficient. In 1923, plants with an annual output of $1,000,000 and up constituted 5.3 per cent of the total number of all establishments. They employed 57.1 per cent of all wage earners and produced 66.4 per cent in value of all manufacturers. In 1919, they also employed 57.1 per cent of all wage earners and produced 68 per cent of all products with the same percentage of total workers as in 1923. These statistics show a striking growth of these large scale industries as compared with data covering conditions twenty years ago. The statistics are not significant with regard to any particular plant as they pertain to per capita production in each given group compared with that in all other groups combined.

WAR BLOCKADE HELPED IN MARKETING A LIME FOR THE ROCKWELL LIME COMPANY

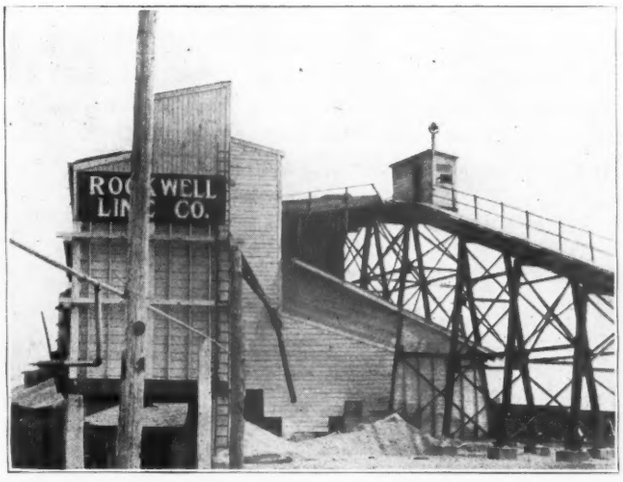
By E. D. Roberts

ENFORCEMENT of the blockade placed upon the Central European powers during the late World War compelled the manufacturers of this country to look around for a substitute for what was called Vienna lime. This was used for polishing steel and other metals and up to that time was imported from Austria. After testing samples of ground lime from various parts of this country, is was found that the sample submitted by the Allwood Lime Company was the best substitute. Production was started immediately by the Allwood Lime Company followed later by the Rockwell Lime Company whose quarry is over the fence from that of the Allwood Lime Company. The Allwood Lime Company were the first in this country to market a Vienna lime.

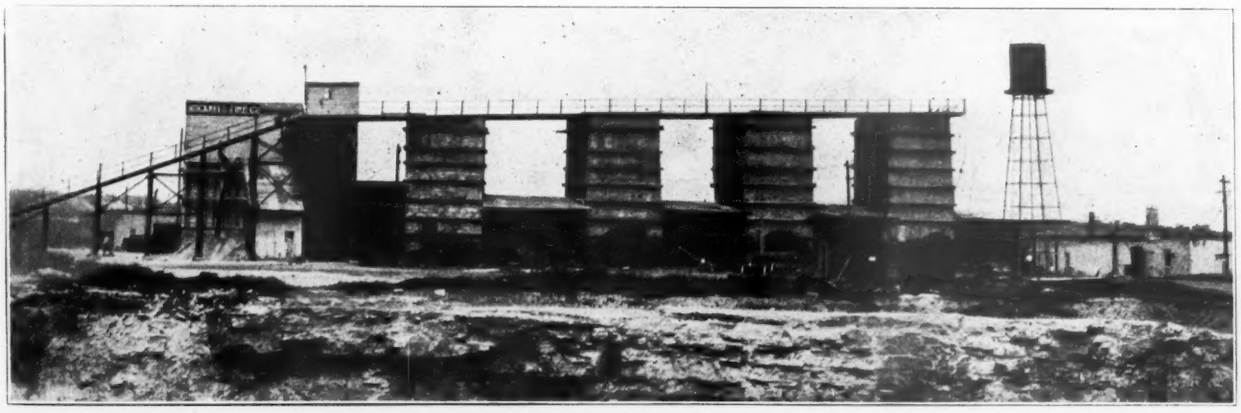
It was difficult for some to understand why lime from this deposit would take the place of the imported Vienna lime, while the samples submitted by other concerns were rejected, while some of these showed practically the same chemical analysis as the ones accepted. We now know that the character of the lime depends largely upon the fossil from which the deposit was made, and this explains why this locality was favored when making the selection.

The plant is located at Rockwell, a station on the Soo Line, but the postoffice address is Francis Creek, Wisconsin. Mr. Mike Brisch, of Chicago, controls the company and has placed Mr. Joseph Koehly in charge as plant superintendent. The present quarry occupies an area of about 6 acres with a face of about 28 feet. The deposit is overlaid with from one to three feet of soil which is removed by hand and shoveled into dump wagons and hauled away. A Sanderson Cyclone well drill puts down 6 inch holes 15 feet from the face and on 16 foot centers. These holes are then loaded with enough dynamite to carry above the water, and the balance of the charge is made up of black powder. This trouble with water in the holes is due to two large springs which flow into the quarry. The water is pumped out with an 8 inch by 6 inch Fairbanks Morse centrifugal pump operated by a 30 h.p. General Electric motor. A 2 inch centrifugal pump, direct connected to a 7½ h.p. motor, both made by Fairbanks Morse, supplies water from the quarry flow for plant use.

A Chicago Pneumatic compressor, operated by a 25 h. p. General Electric motor furnishes air for operating the Denver Rock drills which are used to drill the large blocks of rock brought down by the big blasts. The kiln rock is first sorted and loaded into Easton dump cars, these being hauled to the foot of the incline by a mule. During the winter the spalls and chips are left to accumulate on the quarry floor and are reclaimed during the spring and summer months when there is a demand for crushed stone. During the summer these are loaded into cars as soon as the kiln rock has been selected. Both the kiln rock and the small pieces



Crushing Plant with Incline at Right



Kilns in Center, Crusher House at Left and Lime House at Right

Deposit After Shot Has Been Fired

are hauled up the same incline by a Fairbanks Morse hoist, operated by an electric motor and controlled by a man on top of the kilns. The cars are drawn up the incline and spotted at the proper point by the hoist. If the car is filled with spalls, it is dumped into a large steel bin; if with kiln rock, it is dumped into the desired kiln.

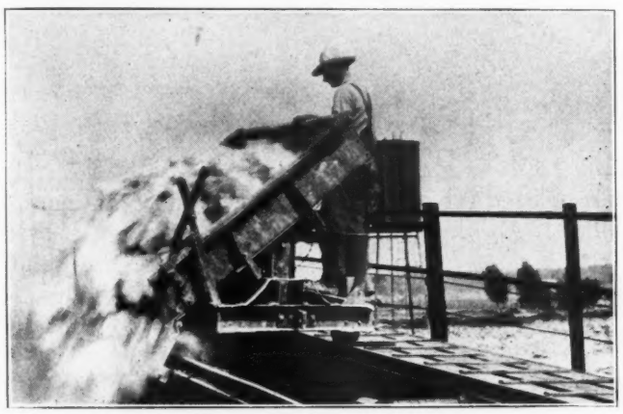
A Telsmith plate feeder draws the material from the large steel storage bin into a Telsmith reduction crusher which crushes it and discharges it into a Telsmith revolving screen producing three grades of stone; namely, dust to ¼ inch, ¼ inch to 1 inch, and 1 inch to 2 inches. The rejects are chuted through an 8 inch pipe back to the reduction crusher, while the rock passing through the screen falls into the proper bin below or is chuted to outside storage if desired. Most of the rock is sold to the county for road repair and building. The

Loading Cars with Limestone

kiln rock is dumped directly into the top of one of the four square masonry kilns which are of the vertical shaft type. The upper three feet of the kilns are constructed of reinforced concrete which forms a cap protecting the wall from damage due to falling stone from the dump cars.

Wood is used for burning the lime and is shipped by car and unloaded onto wagons to be hauled to the yard storage or to the firing floor. Advantage has been taken of the topography to have a dirt firing floor, claimed by many to be safest from the viewpoint of fire hazard. The burned lime is drawn off at the bottom of the kilns into wheelbarrows in which it is left to cool before further handling. When cooled, the largest lumps are sorted, to be used for the manufacture of the domestic Vienna lime, and the remainder is wheeled into box cars for shipment.

The lumps selected for the manufacture of the Vienna lime are wheeled to the dressing floor where all the outside dirt is removed leaving clean white lumps which are then wheeled into an adjacent building where they are fed into a Sprout Waldron reduction crusher. After reducing the lumps to an apparent powder, it discharges into a Cummer elevator which raises the material and discharges it into a Cummer buhr mill. After further grinding it is discharged into a spout leading into the top of a steel drum. This has been crated with the exception of one board, and is placed on a platform which shakes the drum to insure its being completely filled. When filled, the crated drum is slid onto a truck which carries it to a point where it is sealed and weighed. This Vienna lime, ground and sealed in the drums, is shipped all over the United States and some has been exported to Japan.

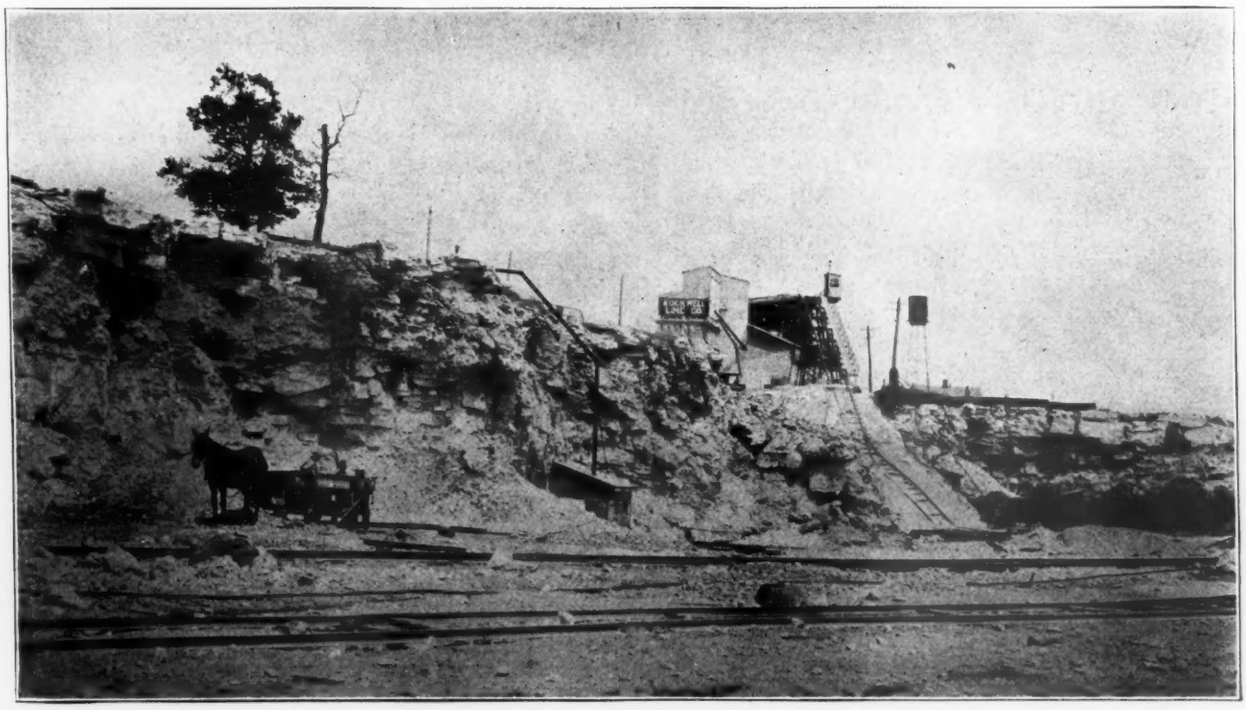


Dumping Lime Stone into Kilns

Automobile Production In 1926 May Surpass 1925 Figures

The total production in the United States during 1925 for passenger automobiles was 3,696,490 and 478,396 for trucks. If 1926 production maintains the same rate of increase during the last six months as it did in the first six months the total output for 1926 of passenger automobiles will be 4,099,000, and for trucks it will be 530,000. This estimate is made by Ernst and Ernst and based upon 1925 figures. During the first six months of 1926 2,070,390 passenger automobiles and 254,387 trucks were produced. During the first six months of 1925, 1,866,131 passenger automobiles and 229,114 trucks were produced.

There will be more than seventy exhibits of commercial safety devices, methods and appliances at the fifteenth annual safety congress.



Mule and Dump Car for Hauling Stone to Bottom of Incline

AUGUSTA LIME COMPANY BUILDS NEW PLANT

SITUATED about a mile east of the city of Staunton, Virginia, as the crow flies, is located the lime plant and quarry of the Augusta Lime Company, Inc., formerly the Staunton Lime Products Company. The new company, which has rejuvenated and greatly modernized this old industry, commenced operations on January 1, 1926, with a total investment of $200,000 of new capital. The plant, in its main unit, is 90x60 feet in size and is equipped with three large kilns measuring 50 feet in height by 12 feet in diameter. Over 30 men are regularly employed here. The daily capacity of the plant is 60 tons of finished lime. The new company has space for four more kilns of the same size, which it is expected will be built and put in operation in the near future.

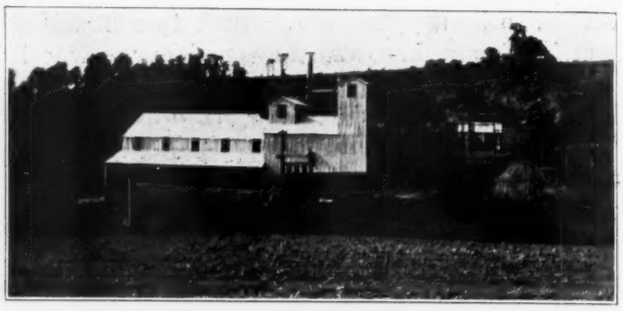
The kilns extend from the top of the plant, where the crude rock is poured in, to a sort of underground floor where the burnt product is extracted. At the top of each kiln is a huge metal top shaped bell. This acts as an automatic valve, which closes

The Incline from the Quarry at the Right and the Mill at Left

and renders the kiln airtight after the lime has been dumped in. The crude high magesium and calcium rock is quarried about 150 yards east of the plant and is hauled up a high chute to the kilns in dump cars.

The lime is drawn out in a caustic condition. Most of it is then run thrugh a large hydrator, during which operation there is an increase of 25 per cent in bulk. Part of this caustic lump is barreled and sold as Blue Star barreled lime, used mostly for building purposes. The greater part of it, however, is run through a hydrator from which it comes in a condition much resembling flour.

Hydrating is done in a Kritzer hydrator, which consists of six cylinders, measuring about 20 feet long by 2 feet diameter, ranged one above another and connected at alternate ends. These cylinders contain paddles, the direction of whose movements alternate in every other cylinder. In the first cylinder at the top the lime is mixed with water and forced by the paddles through each succeeding cylinder until it reaches the bottom. From here it is forced through the mill, the coarse and fine separated, and the fine shot to the storage reservoir. From this stage the lime is passed through a large, powerful Raymond mill where the lumps are separated by centrifugal force from the finely sifted lime. The latter is run into a large storage reservoir. The bagging is done by Bates Valve baggers, which automatically fill the 50 pound sacks. The kilns are drawn every four hours, or three times a day: at 7 a. m., 11 a. m., and 3 p. m. A feature of



View of the Main Mill

this plant is the fact that electricity is the only power used for operating the machinery and equipment. An inexhaustible supply of water is had from a deep well at the western end of the plant, where an automatic pump is used. The underground space with its concrete floor is used mostly for storage purposes, as there is room for 2,000 tons of barreled and sacked lime ready for shipment. A large 34-inch smoke stack extending some 30 feet above the top of the plant, furnishes exit for the many gases eliminated by the burning processes, and acts as a draft. Induced draft is used. A 15 h.p. motor and fan draws in the air and forces out the gases.

Three grades of products are manufactured by this company; Blue Star Barreled lime, unslaked, for building purposes; Red Star mason's hydrated lime, in bags, for masonry and water-proofing purposes; and Boss lime, in sacks, for concrete and building work. The company's bulletins also call attention to the fact that "One-half of the farm area of the United States needs lime." The officers of the Augusta Lime Company, Inc., are: R. L. James, of Pittsburgh, president; J. Campbell Brandon, of Butler, Penn., vice-president; M. A. Denkle, Pittsburgh, secretary and treasurer; N. C. Taylor, Staunton, assistant treasurer; M. C. Taylor, manager. M. C. Taylor has had charge of all building and the installation of the machinery. The officers of the old Staunton Lime Products Company, which did business from 1916 to 1926, were: Dr. H. N. Leavell, president; M. C. Taylor, vice-president; and Randolph M. Valz, secretary and treasurer.

REFINING AND PREPARATION OF CHALK ESTABLISHED IN ARKANSAS

By H. C. Shields

DURING the recent war many manufacturers in the United States who were importing certain materials from abroad were confronted with a situation wherein it became impossible to continue importation. This resulted in a more intensive study of our own natural resources and the possibility of being able to discover or produce such materials, superior if possible or at least equal in quality, to the imported commodity. The importation of English and other chalks has now increased to a place of considerable importance both in bulk and valuation. Statistics show that we are importing annually chalk and chalk products having an approximate valuation of $40,000,000. This is due primarily to the fact that for a number of years we thought it impossible to produce a domestic commodity combining all the seemingly necessary physical and chemical characteristics of the imported chalks.

The rapid growth of the rubber industry, in which considerable amounts of whiting or chalk are necessary in preparing the compounds, and the necessity of a pure and cheap inert filler in the manufacture of various medicinal tablets, pastes, compounds and fillers, for which it was thought necessary to utilize imported chalks, have caused our research engineers, chemists and others vitally interested in this problem to investigate thoroughly our own natural resources with the possibility of discovering or being able to produce a satisfactory product for these various requirements. A careful study of the imported chalks show them to be "amorphus" in structure. When ground to extreme fineness the particles, under a high power microscope, appear spherical or globular in form, and this particular characteristic seems most essential in various manufactured products wherein chalk or whiting is a component part.

To the state of Arkansas belongs the distinction of having located within its borders the only known deposit of chalk in the United States having the same characteristics as the English and French chalks. Located in the southwest part of the state in Little River and Sevier Counties there are large beds or deposits of pure white chalk known as the White Cliffs deposits. These deposits are located about nine miles from Ashdown the county seat of Little River County and consist of approximately nine hundred acres of chalk lands. The main deposits are located on a strip of land extending north

Aeroplane View of White Cliffs, Arkansas, Showing the Properties

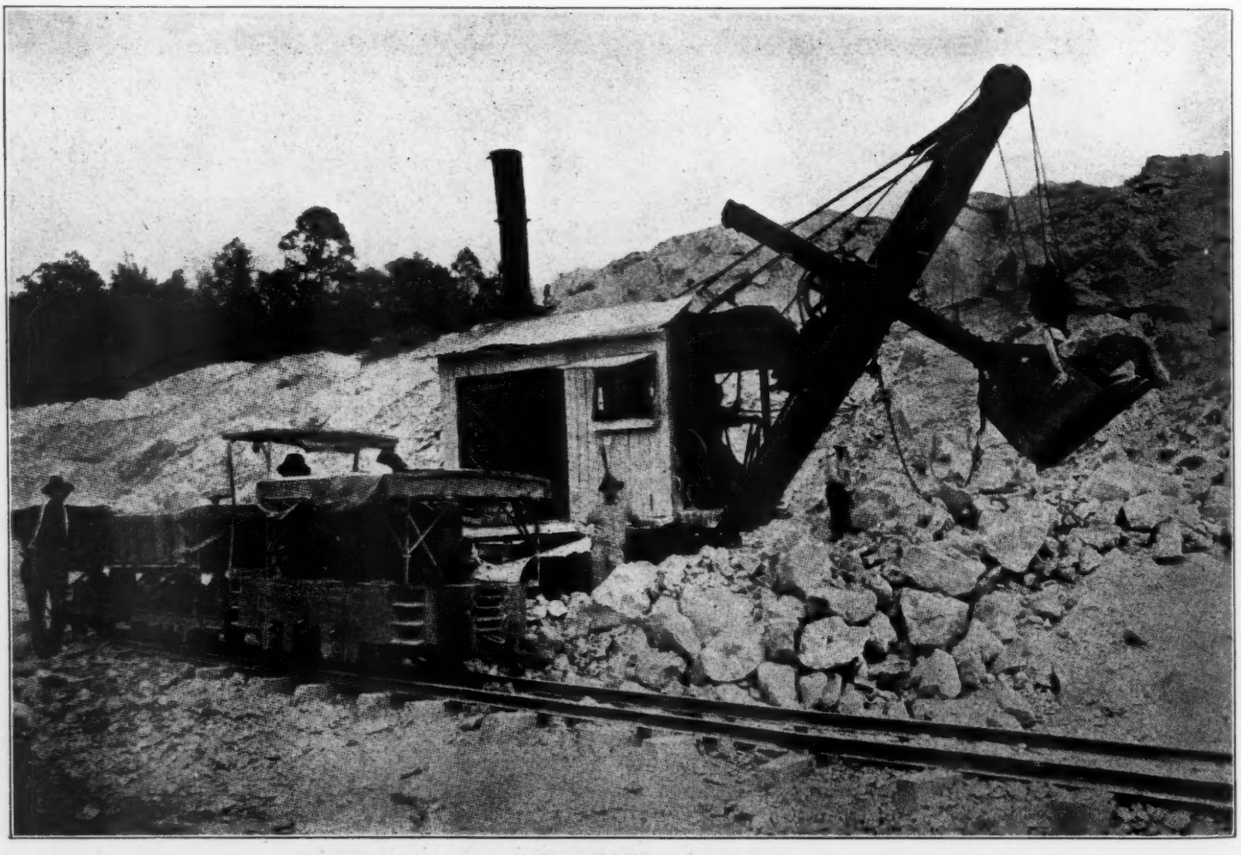
and south and on the east side of the Little River. The central portion rises abruptly from the flood plane of the river forming a marl and chalk wall rising from 75 to 125 feet above the flood plane. On top of this wall is a table land with hills that reach a height of 125 feet above the flood plane near the southern end of the chalk deposits.

These chalks and chalky marls underlying them are salt water deposits laid down in cretaceous times and are of the Upper-Cretaceous. When the chalk in this region was formed, the shore of the cretaceous sea had passed so far north of this region that only small quantities of sediment were brought from the land. It is supposed this sea was very deep. At any rate the bottom was below the reach of the waves. It is thought that during a long period of time the conditions of this sea remained constant while the limy skeletons of countless microscopic organisms together with the billions of fossils and shells formed the chalk deposits. The chalk from these cliffs scales off rapidly in great conchodial flakes and, owing to the irregularity of this process, its face, instead of being a continuous plane, is composed of many reentrant angles, resembling bastions of a fortress. These cliffs have long been a land-mark of this region, and their remoteness from the lines of travel is the possible explanation of their having for so many years escaped the attention of the American geologists.

Prof. John C. Brenner, Ph.D., state geologist of Arkansas, in writing of this material states as follows: "The value of this chalk for various purposes is hardly appreciated at the present time. When we consider this chalk is a very soft and pure rock and, therefore, does not require the grinding the more compact limestones do, and further the ease with which it can be burned to lime, its superiority over other limestones may be seen. The fact that this bed is the only known one to exist in the United States greatly increases its value. An examination of this material shows it to be in some ways superior to the chalk from the celebrated Chalk-Cliffs of Dover, England."

The following is a description of a sectional formation at a height of 135 feet:

	Feet
1. Massive, creamy-white chalk in beds from a foot to about ten feet thick, separated by thin partings of slightly laminated chalk. The variation in the character of the chalk from bed to bed is not perceptible on physical examination. The stratification planes are not clearly defined except on weathering the rock	60
2. Massive dull bluish white siliceous chalk slightly harder than the pure chalk of 1, without indication of bedding and because of its hardness projects to a steep bench overhanging the less chalky beds below ..	25
3. Massive, dull blue, argilaceous chalk marl, very friable, weathers in recesses beneath the chalk	8



A View in the Quarry

4. Bluish, chalk-marl and contains great numbers of fossil shells 7
5. Chalk-marl from top downward to level of river 35

The comparative analysis of this material is as follows:

	White Cliffs Chalk	English Chalk
Carbonate of lime	92.47%	88.50%
Carbonate of magnesia ...	Trace	Trace
Iron oxide	1.05%	0.89%
Silica	3.02%	5.45%
Alkalies	None	2.61%

In 1895 a small portland cement plant was erected on this property, the originators of this project appreciating the value of this chalk as a cement making material. The small demand for cement within the state at that time together with the antiquated methods of manufacture resulted in the subsequent closing of the plant some five years later. However, the quality of the cement was excellent, and it was used in the building of many important structures within the state.

Our inability to obtain imported chalks during the recent war together with the rapidly growing demand for this material brought about a condition whereby several of our large industrial concerns, who were using the imported chalks, delegated their research engineers and chemists to work out a process for neutralizing the extraneous matter in the Arkansas chalks. It is needless to say this has been successfully accomplished, like all problems which have been delegated to the American research engineer, and it is an accomplishment that we can justly feel proud of, inasmuch as we are no longer entirely dependent on foreign countries for our supply of this most essential commodity. The process employed in the refining and preparation of this Arkansas chalk is very simple and inexpensive, and it can now be classed as a complete commercial success. The development of this product has now reached a point where it can be successfully used for the manufacture of whiting, base for medicinal tablets, base for certain makes of tooth pastes, base of cream of tartar in various brands of baking powders, filler for rubber compounds, filler for paints, linoleum, electric wire covering, window shade material, cotton seed oil fertilizer, asphalt and especially adapted for the manufacture of a readily soluble agricultural fertilizer, and many other commercial purposes.

In 1923-24 an experimental plant was built on this property for the purpose of developing correct methods of processing and producing a suitable commercial product. The equipment and methods of production in this plant are as follows:

The quarry operations are designated locally, as quarries number 1 and 2. Drilling is done by Model D-24 Ingersoll Rand drills. Loading is being done in one quarry by hand and in the other by means of a number 18 Osgood steam shovel. Western dump cars of the side-dump type, of 1½ yard capacity, 36 inch gage, are used to bring this

There are Millions of Tons of Material

material to the crusher. These cars are hauled by the means of a 3½ ton Plymouth gasoline locomotive. The plant buildings are of frame construction, the timber being obtained on the company's own property and sawed in its own saw mill. More than 1,000,000 feet of hardwood timber were used in the plants construction.

The main breaker in the plant proper is a number 6 Mammoth Williams crusher with an opening of 48x48 inches, which takes the material from the quarries in sizes as large as 40 inches. This crusher is fed by a 4 foot steel feeder on 20 foot centers, which in turn affords a constant and uniform feed. The crusher is set to discharge at 1½ inches, and its product is received by an 18 inch belt conveyor of 150 foot centers, which is equipped with a tripper for discharging the material to the various receiving bins. This equipment as well as all other elevating and conveying machinery is of the Weller type and design.

There are 27 bins having a combined storage capacity of approximately 25,000 tons of crushed material. The building housing these bins is of timber construction covered with corrugated iron. A preliminary direct fired dryer, oil fired 4 by 40 feet is used for the first drying, and from this the material passes through the secondary dryer which is 7x80 feet, indirect and oil fired. From this machine the material is elevated and conveyed to the storage bins above the pulverizers, and at this point certain chemicals in small proportions are mixed with the crushed chalk to counteract the combined silica and other extraneous substances in the raw material.

The battery of fine pulverizers consists of three four roller high side Raymond mills equipped with double cyclone separators and tubular collectors. For the production of high grade whiting this grinding and separating system is so arranged that a fineness of 99 per cent passing the 325 mesh sieve may be obtained. For the production of asphalt filler and other ordinary fillers a fineness of only 85 per cent 200 mesh is required. From these pulverizers the material is conveyed to two of six five car storage bins, these being two bins each for whiting and four for other fillers and fertilizer. These bins are of special construction lined with waterproof paper and made of close tongue and groove timber so that they are moisture proof and practically air-tight. At the extreme end of the row of bins is the packing house which is equipped with two Bates and two Howe packing machines. Material to be ground for agricultural fertilizer is moved from the storage bins, or by-passed direct to a number 4 Jumbo Williams crusher which is driven from the main line shaft. The finished product is moved likewise to storage.

The power plant's chief unit is an 18x36 inch Corliss engine, developing 350 h.p. Steam is provided by three Heine water-tube boilers oil fired, 200 h.p. each. Electric current for plant lighting is furnished by separate engine direct connected to generator. Compressed air is furnished by a 150 h.p. Laidlow-Dunn compressor. There is a well equipped machine and blacksmith shop as well as adequate store room adjacent to the mill.

This company has provided for the executive staff a very confortable and commodious club house in which the business of the company is transacted. At the same time this provides sleeping and eating quarters for the operating staff. This club house is located several hundred feet back of and above the plant, and the view from the large front porch is one of the most interesting and finest in southwest Arkansas. The plant is located on the main line of the G. N. & A. R. R. connecting at Ashdown with the K. C. Southern R. R. and "Frisco" R. R. and at Nashville with the Missouri Pacific R. R., thus affording most excellent shipping facilities in every direction for its products.

This enterprise is typical of American aggressiveness and the willingness of our large industrial corporations to expend vast sums of money in developing our own natural resources. They not only produce essentials for their own consumption, but assist in placing these on the market at a lower price than the imported products. At the same time they stop the outward flow of American dollars to foreign countries and provide employment for our own citizens.

National Power Exposition

The National Exposition of Power and Mechanical Engineering will be held in the Grand Central Palace in New York City from December 6 through 11, 1926. This is the fifth exposition and will be significant of the development of mechanical power by the industries of the United States. Four floors of the Palace will be used for the exhibits of all types of power and heat generating, distributing and using equipment, refrigerating, heating and ventilating machinery, machine tools and power transmission devices, as well as exhibits of power plant apparatus. More than 450 exhibitors will be represented.

Great strides are being made in generating power, and are proportionate to progress along industrial and commercial lines. The exhibits which will be presented at this exposition in December will undoubtedly be of vital interest to executives in all fields of industry.

How to handle explosives safely in quarry work will be discussed at the fifteenth annual safety congress which will be held at Detroit from Oct. 25th to 29th, inclusive. E. E. Evans, President of the Whitehouse Stone Company, Toledo, expects a large attendance at the sessions held especially for people in the quarry industry.

THE NEEDHAM SAND AND GRAVEL COMPANY PRODUCES MATERIAL ECONOMICALLY

By F. A. Westbrook,

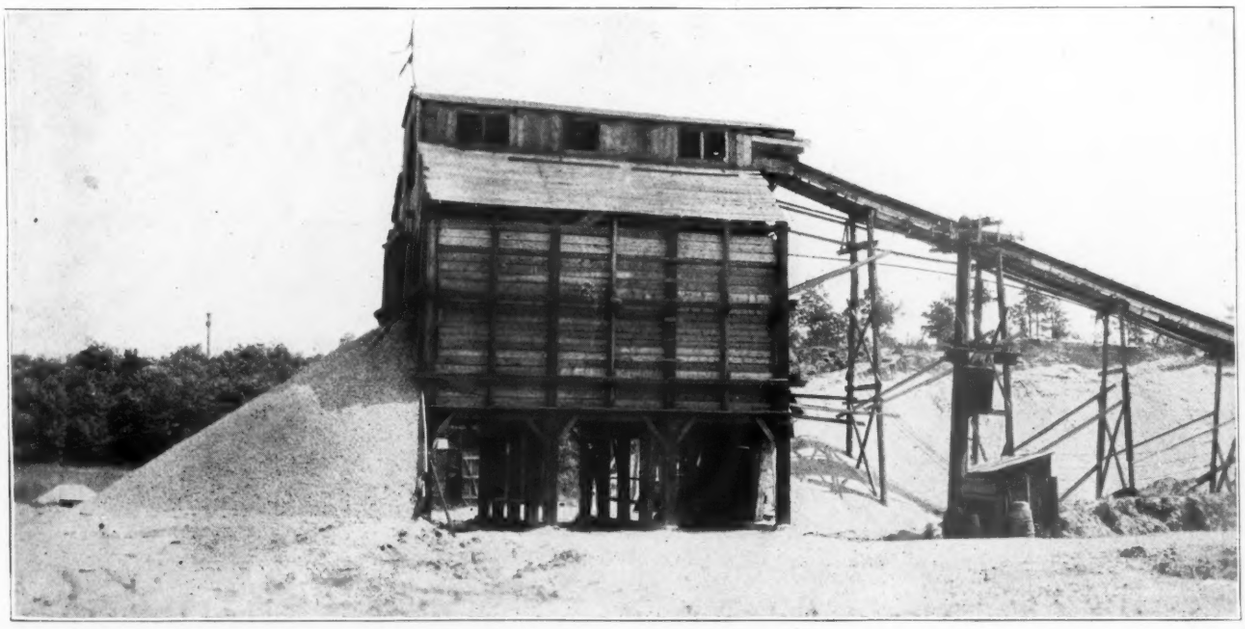
THE basin of the Charles river, in the vicinity of Boston, is very largely an enormous bed of sand and gravel of great depth and with comparatively few large stones. As might be expected, there are many sand and gravel operations in this region, and all of them have water available for washing, though they do not all use it. The Needham Sand and Gravel Corporation, Needham, Massachusetts, is at present working on a tract of 27 acres of this deposit. The bank is approximately 50 feet high above water level which is the same as that of the Charles river. The depth of the deposit is approximately 70 or 80 feet below water level and extends to bed rock. At the present time, the material is not being taken out below water level. Clay is entirely absent.

The excavating is being done by means of a derrick and hoist. The derrick has an 80 foot boom equipped with a 1¼ yard Blaw-Knox bucket and the hoist is a Mead-Morrison driven through a chain by a 50 h.p. General Electric induction motor provided with a General Electric starting compensator having push button control. The derrick is also provided with a swinging engine used for turning the boom. This consists of a Mead-Morrison outfit, driven by a Lincoln Electric Company 7½ h.p. induction motor. Roebling wire rope is used with this equipment.

Material is dropped from the bucket into a wooden hopper, across the top of which are placed railroad rails spaced so that nothing larger than 6 inches will pass through. Stones of this size are at present being placed on one side, because the belt conveyor to the scalping screen and crusher is not powerful enough to handle such heavy material. In fact, stones of this size are so infrequently encountered that they do not accumulate to any extent.

A 20 inch belt conveyor transports the sand and gravel from the hopper to the scalping screen. A man is stationed at the hopper to manually control the flow of material to the belt. All the conveying and screening equipment has been provided by the Underwood Company of Boston. The scalping screen removes stones over 2 inches in size and chutes them into a number 4 Champion jaw crusher and an elevator deposits the broken stone from the crusher to the scalping screen. The material which passes through the scalping screen is taken by a second belt conveyor to the sizing screen. This consists of two sections of wire mesh; one for removing the fine and concrete sands with the help

Office and Weighing Platform



Conveyor to Sizing Screens. Note Storage Bins and arrangement for Loading Trucks

Conveyor to Sizing Screens with Pump House at Right

of water, and another for separating the remaining material into the 1 inch and smaller, and 2 inch stones.

The four sizes of stones are deposited in bins under which trucks can be backed ready for loading. Chutes are arranged at the bins for making surplus storage piles on the ground from which trucks can be loaded by a shovel. However, at present the surplus is being moved to a point near where the shovel is in operation, so that it can be used for loading the trucks. This procedure avoids moving the shovel to the bins. There is no rail connection at the quarry and all shipments are made by trucks.

Water is obtained from pipes extending about 25 feet down into the sand and is pumped to where it is needed at the sizing screen by means of a Gould pyramid pump driven by a 5 h.p. General Electric induction motor. Weighing is done on a Howe scale located alongside the office.

Mr. John McWade, superintendent, with the help of an engineer at the hoist, a tender at the hopper

Conveyor to Sizing Screens with Pump House at Right

Hopper Loaded by the Bucket at Right and Conveyor to Scalping Screen

where the belt conveyor to the scalping screen is loaded, an attendant at the sizing screens and a general man have produced 770 tons of material in a day of 9 hours with the equipment described. This is the maximum figure but is not far above the average production at the plant.

In addition to the property where the operations just described are carried on, the company owns another tract of 105 acres. A portion of this land is where the top was removed during the years 1861-1865 for filling the Back Bay section of Boston, and is well above the water line. The rest of this additional acreage has not been touched.

At the present time an Erie steam shovel with a ½ yard dipper is at work taking the natural mixture of sand and gravel from the untouched bank and loading it into trucks, as there is a good demand in the neighborhood for this material. Plans are now being perfected for building a large screening plant on this property in the immediate future.

Bucket Dumping into Hopper. Note Water Level indicated by Pools in Left Background

Conveyor Discharging into Scalping Screen. Right Foreground Conveyor to Sizing Screens

This plant is to be a steel structure with a storage capacity for 27,000 tons of sized material. The sand is to be washed, as in the other plant.

International Road Congress In Progress in Italy

The Fifth International Road Congress inaugurated by the Italian Government will open September 6, 1926 at Milan, Italy. The Congress will last six days and officially close in Rome on September 13th. This congress will continue studies which were begun in Paris and continued in Brussels in 1910, then again in London in 1913 and in Seville in 1923. An International Road Exposition starts in Milan on September 1st and continues through September 20th.

The program at the Congress includes several American speakers including Frank Sheets, chief engineer, Department of Highways for Illinois and Charles R. Ege, manager of the Highways Bureau of the Portland Cement Association.

Oil Shale Dust Found Explosive

Tests conducted at the Pittsburgh, Pennsylvania, experiment station of the Bureau of Mines, Department of Commerce, have demonstrated that oil shale dusts are explosive, and that their explosiveness increases with their combustible content. The formation of dust during the mining and handling of oil shale is almost unavoidable, and the Bureau considers that the same precautions against dust explosions should be taken in the industries producing or working with oil shale as are taken in safely operated coal mines.

Few of the problems of mining oil shale have as yet been encountered and solved in the United States, because no commercial production of shale oil has been attempted. Mining methods will depend largely on local conditions and on the physical characteristics of the deposits, but it is probable that underground methods similar to those used in coal mining will be used. In the eastern states where the black oil shales of a cannel-coal nature overlie coal seams near the surface, and elsewhere where conditions permit, stripping or quarrying methods may be feasible.

The dust produced in Scottish shale-mining operations, according to some investigators, is noninflammable and nonexplosive. However, this must not be taken to indicate that oil shale of similar characteristics will be encountered in American shale mines. The results of the tests made by the Bureau of Mines show that oil-shale dust may present a source of danger in American mines, particularly when comparatively rich material is being worked.

Oil shale contains compounds of carbon and hydrogen that are either of a petroleum nature and are strongly absorbed upon the incombustible part of the shale, or else are present in the shale as a compound ("kerogen") which has the property of changing into petroleum-like products when acted upon by heat. The oil shales may contain varying amounts of the organic matter, ranging from a trace to more than 66 per cent, depending upon their richness; therefore, it is important to know whether the dusts formed in mining and handling these oil shales are explosive when mixed with air and if so, to indicate remedial measures. Explosibility tests of several pulverized oil shales, selected as being typical of those which in the future may be used in commercial shale-oil production were made by the Bureau of Mines at Pittsburgh. These shales were from Indiana, Colorado, Nevada, Utah, and New South Wales, Australia.

Government Estimates Building

The Department of Commerce estimates that the national building figure for 1926 will reach $8,000,000,000. This estimate takes into account the fact that more rural building will be done this year than in any previous year.

SMALL POWER PLANT FACTORS

By Charles Longenecker

THERE frequently arise some questions as to what equipment to install for firing small and medium sized boilers. Such equipment may come under consideration for handling fuels, other than coal, but in the great majority of boilers coal is the predominating fuel; hence its use only will be discussed. Coal may be fired by hand, in stokers, or in the powdered form. When fired by hand the boilers efficiency will average 55 per cent to 60 per cent, while when burned with stokers, this efficiency will be increased to 65 per cent to 75 per cent, in the form of powdered coal 75 per cent to 80 per cent can be reached. A casual glance at these percentages may lead one to infer that powdered coal should be given preference in every case, but such inference is not justified, due to other factors which have an equal or greater significance as compared with "efficiency." This suggests the desirability of presenting the several factors which control the choice of the proper coal burning equipment. The factors are:

Size of boiler.
Number of boilers.
Type of boiler.
Grade of coal to be burned.
Rating at which boiler will be run.
Labor conditions.
Ordinances governing "smoke."
Hours boiler must be in continuous service.
Steam pressure carried on boiler.
Setting height of boiler.
Cost of coal.
Power available.
Efficiency.

Size of Boiler

Boiler size is here measured in the horsepower generated. Small boilers are rated at say 300 h.p., as a maximum, medium sized from 300 h.p. to 1,000 h.p., and large boilers from 1,000 h.p. to 3,000 h.p. The largest size boilers mentioned are found in central stations and power plants having a very heavy steam demand. Most boilers under 300 h.p. are of the horizontal return tubular type and are either hand or stoker fired. There is no rigid line of demarcation between the horizontal return tubular type and the water tube type as to the horsepower generated. In general, water tube boilers are not common below 250 h.p., neither is the horizontal return tubular type common above 300 h.p.

The hand fired boiler is becoming more and more a thing of the past, but in small sizes it is still frequently found. Hand firing has been carried on in sizes as large as 600 h.p., but very rarely, as it is not economical either in fuel or labor. The temperature of the waste gases on hand fired horizontal return tubular boilers will run as high as 600° F. and on water tube about 480°, while the excess air will probably run about 100 per cent. If stoker fired, this excess air can be reduced to 50 per cent. Considering the size alone it will, in most cases, be found most economical to equip boiler, of whatever type, with stokers unless the size is below 100 h.p. There are some very good underfeed stokers for small boilers which give excellent service. Very seldom are boilers under 300 h.p. fired with powdered coal, and unless conditions are exceptional, its use is not advisable. On horizontal return tubular boilers powdered coal has not given satisfaction nor is the expenditure warranted when measured on the cost per 1,000 pounds of steam generated. It is possible the unit mill may eventually meet the requirements, but this is very doubtful for the reasons just mentioned.

On size above 300 h.p., coal on stokers, and powdered, can be burned with the best of results. Water tube boilers under 300 h.p. are being fired with powdered coal very successfully but such small installations are warranted only where conditions are exceptional.

Number of Boilers

The number of boilers in operation affects the manner of firing especially as to the quantity of coal burned. Where one or two boilers may not justify powdered coal, three or more may. Hand firing may be more economical on a single boiler but not so on several. On horizontal return tubular boilers it is very hard to obtain over normal rating, hand fired; but if stoker fired, 150 per cent of rating is easily obtained. This feature is important in a plant which is hand fired, on say two boilers. When hand fired, if one boiler must be cut "off the line," the second can supply only the normal amount of steam; while, if stoker fired, the production of steam on the second boiler can be increased from normal to 150 per cent to 175 per cent and this one boiler will very likely carry the entire load.

Type of Boiler

The type of boiler affects only the method of firing, where the difference in design is radical. Thus the marine type of boiler can be hand or stoker fired, but so far powdered coal has not been inaugurated. Horizontal return tubular boilers are suitable for stokers, or hand firing, but not for powdered coal. Vertical or horizontal types of

boilers can be fired in any manner. In degree, some types of boilers are more suitable than others for powdered coal, or stokers, but it is possible to fire either kind either way although the results may not be as satisfactory.

Grade of Coal to be Burned

There is no question as to the influence of the grade of the coal on the method of firing. Coal may be divided into coking and non-coking, also, into high volatile and low volatile, together with high ash and low ash, and high moisture and low moisture. All four of these classifications have a bearing on the selection of the coal handling equipment.

In every locality there is usually some one coal which, for economical reasons, it is preferable to burn. Preliminary to the selection of the manner of firing the boilers, a survey should be made and a coal chosen which combines low cost with assured, year round delivery and satisfactory quality. Knowing the characteristics of the coal, approximate equipment can be selected.

For hand firing a low volatile, non-coking coal gives very satisfactory results. If the coal is to be burned in pulverized form, the volatile should preferably be high, but the coking tendency is immaterial. Stokers will burn coal of practically any percentage of volatile matter, either coking or non-coking, but not all stokers will burn every grade of coal equally well. Some will burn certain grades with a much higher efficiency than other grades. This fact should be given weighty consideration in the choice of a stoker as otherwise serious complications may arise. Thus a stoker that would burn Illinois coal most efficiently would not be suitable at all when handling Pittsburgh coal. Mid-Western coals are high in moisture, while Pittsburgh coals are low. No mention is made of the ash, but it is desirable that this be low in every case.

There are many types of stokers such as over and underfed, chain and traveling grate, natural and forced draft, etc., so there is a wide range from which to choose. Very frequently where several companies manufacture the same type of stoker, in every way identical in principle of operation, it will be found that the stoker of one manufacture excels in certain features, while that of another manufacturer excels in other features. The significance of these various features must be fully appraised in regard to the particular coal to be burned. Today, firms manufacturing a variety of stokers will gladly investigate the various factors to be found at the plant of a company contemplating the purchase of equipment, and will advise what particular stoker will best meet the needs of the company. Guarantees will be made covering the operation of the proposed stokers.

Rating at Which Boiler will be Run

As previously noted it is difficult to obtain a rating much over normal, for any length of time by hand-firing. With stokers, or powdered coal, ratings as high as 300 per cent and 400 per cent are reached as peaks, and in installations, where the setting is adequate in dimension, these ratings can be held for several hours. A continuous rating of 250 per cent is carried in many plants. Such high ratings are not always economical. The most economical rating for a boiler generally is from 125 per cent to 150 per cent. This applies to water tube boilers only and not in central stations.

Labor Conditions

Labor supply and cost are in some cases a determining factor. Where the cost is low and supply ample, it will be found advantageous to hand fire small plants; but where the reverse is the case, stokers should be installed.

Ordinances Governing Smoke

In some communities the ordinances regulating the emission of smoke from stacks are severe and are rigidly enforced, but under any conditions smoke is undesirable. Smokeless stacks are rarely found where the boilers are hand fired, so that to eliminate this nuisance it is practically obligatory to install stokers, or to burn powdered coal. Elimination may not be complete under the latter conditions, but if not it is a question of the manner in which the equipment is operated. Whatever the system of firing employed, there will always be some fine particles leaving the stack but in only rare cases is this emission objectionable where coal is burned in stokers or powdered.

Hours Boiler Must be in Continuous Service

Small boilers operated only eight to ten hours a day are usually hand fired, but where the service is continuous, and especially at high ratings, hand-firing is not permissible. Either stokers, or powdered coal give excellent results on medium or large boilers where the demand is steady, 24 hours in the day.

There are some installations where the boiler is in service only a few days a week. In such plants hand firing is more economical unless the boilers are large.

Steam Pressure Carried on Boiler

The majority of boilers carry a steam pressure of over 100 pounds, but where the steam is to be employed for heating only, a low pressure will suffice. In small plants a light load for heating purposes may require nothing more than handfiring.

Large central stations supplying steam to a congested area, such as is found in cities, fire their boilers with stokers or powdered coal.

Setting Height of Boiler

There is no factor more vital to the success of a boiler installation than the setting of the boiler. In a majority of existing plants the boilers are set too low with the result that the efficiency is low, smoke prolific and maintenance cost high. Many horizontal return tubular boilers are set about 6 feet-0 inches from the floor level. This distance should be 8 feet-0 inches to 9 feet-0 inches. Satisfactory results cannot be secured from a stoker with a height under 8 feet-0 inches. As the boiler increases in size, the setting height must be increased. For a Sterling type boiler of say 800 h.p. the bottom drum should be 8 feet-0 inches or 9 feet-0 inches above floor level, when stoker fired.

Naturally the type of stoker, the design of boiler, together with the grade of the coal, and the rating required, determine the most advantageous setting height. When installing new boilers this height must be correct if economy is to be maintained, while failure to appreciate this feature will give all manner of trouble.

Where the setting height is low the hot gases from the fire bed strike the cold tubes too early in their flow with the result that combustion is not completed. When this happens, fuel is sacrificed and other troubles arise. Unless the gases, while burning, have sufficient volume in which to expand, it is impossible to obtain the best results. It is understood, of course, that a draft of the desired intensity is available.

Cost of Coal

Coal cost may be so low that the saving in fuel is not a particularly unimportant item, while, on the other hand, the cost may be exceedingly high. In this case, an appreciable saving in fuel will justify a greater initial expenditure for equipment which will burn coal at high efficiency. The solution of this phase of the question is purely local and must be solved for each particular case, but there is seldom found a condition where it pays to waste fuel. A waste of fuel is usually accompanied by losses of various natures. Today the coal market is not flourishing, and coal may be purchased at a comparatively low figure, but it is questionable whether in any locality it pays to be wasteful. Conservation of our fuel resources demands the greatest economy.

Power Available

Small isolated boiler plants may have no source of power other than that generated in their own boilers. As it requires power to operate stokers, or powdered coal equipment, the lack of available power may determine the method by which the boilers shall be fired. If there is a surplus of steam from the boilers, a steam turbine can be installed to generate additional power. Some makes of stokers can be operated from the boiler direct as these stokers function on steam at boiler pressure and hence are integral with the boiler. Other makes of stokers, driven by a motor, are not of service where electric current is not available.

Efficiency

The efficiency at which the boilers must function is a controlling factor. In large power stations the loss or gain in a few points in efficiency may mean the success or failure of the station. Today such stations operate at efficiencies approximating 90 per cent throughout monthly periods. The stack gases leave at a temperature of from 200° F. to 300° F.; hence there is very little loss in sensible heat. There is practically no loss in combustible as the CO_2 will run as high as 14 per cent with CO only a trace. As powdered coal is burned in many of these large stations, there is no loss, as combustible, in the ash.

The small boiler plant does not permit the installation of such refinements as are found in the large plants, but every means should be taken to boost the efficiency.

The various factors, mentioned above, are separated in the discussion but in most instances several have an equal influence. Then too a particular plant may have been built years ago, so that the conditions are already determined, and the only recourse, to secure more economical operation, is to revamp the plant. This requires money, but in some cases it is justified.

Predicts U. S. Potash Supremacy

That the United States may become a dominant producing factor in the potash trade of the world was predicted by C. C. Concannon of the chemical division of the Department of Commerce in a speech given at Williamstown, Massachusetts, recently. "We are thoroughly awakened," said Mr. Concannon, "to the gravity of the situation and to the absolute necessity of developing in so far as it is possible a domestic production of this essential raw material. Congress has recently taken steps to determine the necessary data in investigating the vast potash deposits, of a character similar to the French and German beds, which are believed to exist in Texas and adjacent territory. With a realization of the situation facing us, it is not too much to expect that America ingenuity and resourcefulness, supported by the bountiful material resources of our country, will find an answer to this problem, and that from occupying the position of being dependent upon foreign supplies for the essential raw material, we will at least be able in some way to supply our own needs from resources within our own confines. Indeed, it is not too much to hope for and expect that the United States may some day become a dominant producing factor in world trade in potash."

TUNNEL SHOT YIELDS EXCELLENT RESULTS

By J. W. Koster

THE largest blast of its kind ever fired in the eastern states yielded approximately 5½ tons of rock per pound of dynamite, writes J. W. Kostor in the September issue of the Dupont Magazine. On April 13, 1926, a coyote or tunnel blast was set off in the Middlefield quarry of the Connecticut Quarries Company at Reeds Gap, Connecticut, in which 81,000 pounds of Red Cross Extra 40 per cent dynamite was used, making it the largest blast of this kind ever fired in the eastern states. The shot produced approximately 450,000 tons of stone, a portion of which came from the back break.

This quarry is one of the most important operations of the Connecticut Quarries Company, which is one of the largest producers and distributors of trap rock in the New York and New England district. The rock is similar to the trap rock found in the Palisades of New York as to its columnar structure and physical character, and because of its weight, hardness and high resistance to wear, it is in demand for macadam and concrete roads.

The face of the Middlefield quarry is developed to a length of over 1,200 feet and at present runs from 100 to 175 feet in height. While there are many vertical and cross slips in the rock which help to give good fragmentation after a blast, the height of the face has made the snake hole method of blasting unsatisfactory. Also with either the snake hole or bench method of shooting it has been difficult to keep an adequate volume of broken rock on hand for a quarry of this size, which at present produces about 1,500 tons a day.

The well-drill method of shooting has never been tried at Middlefield, but it has been used in other trap rock quarries in New England, and while results have been satisfactory from the standpoint of breakage and volume, the drilling costs for holes 150 feet deep and deeper have been very high, running $6 a foot and higher, so that several years ago the management turned to the more economical method of tunnel blasting. It was found that tunnels four feet high and three and one-half feet wide could be driven for approximately $5 a foot and that much larger burdens could be pulled than was possible where the well-drill system was used. Several shots ranging up to one in which 34,000 pounds of dynamite was used were fired with successful results, and last fall Mr. A. L. Worthen, general manager, and Mr. S. R. Russell of the du Pont Company, planned and laid out the larger shot which was fired April 13.

During the winter three main tunnels were driven. One of them had three wings, and the other two, four wings each, representing in all 974 feet of tunnel averaging 3½ feet in height by 3½ feet in width. The practice is to put one man in a tunnel until 70 feet has been driven, and then supply him with a laborer until the tunnel is finished. The two tunnel men in the employ of the Connecticut Quarries Company have become very proficient and each, during the last month of the work, averaged close to 40 feet a week, driving tunnels very uniform in section and accurate as to grade and line. This work required from four to five holes up to 4½ feet deep for a round. Forty per cent du Pont gelatin was used.

When the tunnels were driven a flooring of 1 by 12 inch planks was laid end to end in order to facilitate handling the boxes containing dynamite and the tamping material. Holes were drilled along the haunch line at ten-foot intervals in which eyepins were set to carry the duplex number 14 waterproof leading wire used to explode the charges. One of the main requisites in loading a shot of this kind is to have an ample supply of labor, and the management supplied up to 80 men for this purpose. Needless to say this end of the job is hard work, especially at the start where the hauls are long, the ventilation poor, and the men unaccustomed to work in cramped quarters. The loading procedure is to arrange the men in the tunnel at three or four foot intervals, and the outside man slides a box of dynamite, with its cover removed, along the board floor and between his legs to the man behind. He in turn relays it to the man behind him, and so on, until it reaches the heading man who dumps the cartridges from the box and packs them in the tunnel. In this way a continuous stream of dynamite is fed into the tunnel and the empty boxes are returned along the side. To make the loading easier and quicker, the dynamite is supplied in 5 by 16 inch cartridges.

The tamping material, consisting of rock ranging from screenings to eight-inch blocks, is handled in the same way, being transported in empty powder boxes and shoveled and stacked so as to fill the tunnel between the dynamite units. The crew here was competent, well supervised and large enough for the work, so that excellent time was made in loading both dynamite and tamping, averaging about 2½ feet a day per man in spite of the inclement weather. The explosive units ranged in size from 1,000 to 3,000 pounds and two number 8 electric blasting caps were used in each unit. All of the units were connected in parallel, and the three tunnels in the same way. To insure detonation, all units in each tunnel were connected with double-countered Cordeau run to the outside and hooked up with the main leading wire.

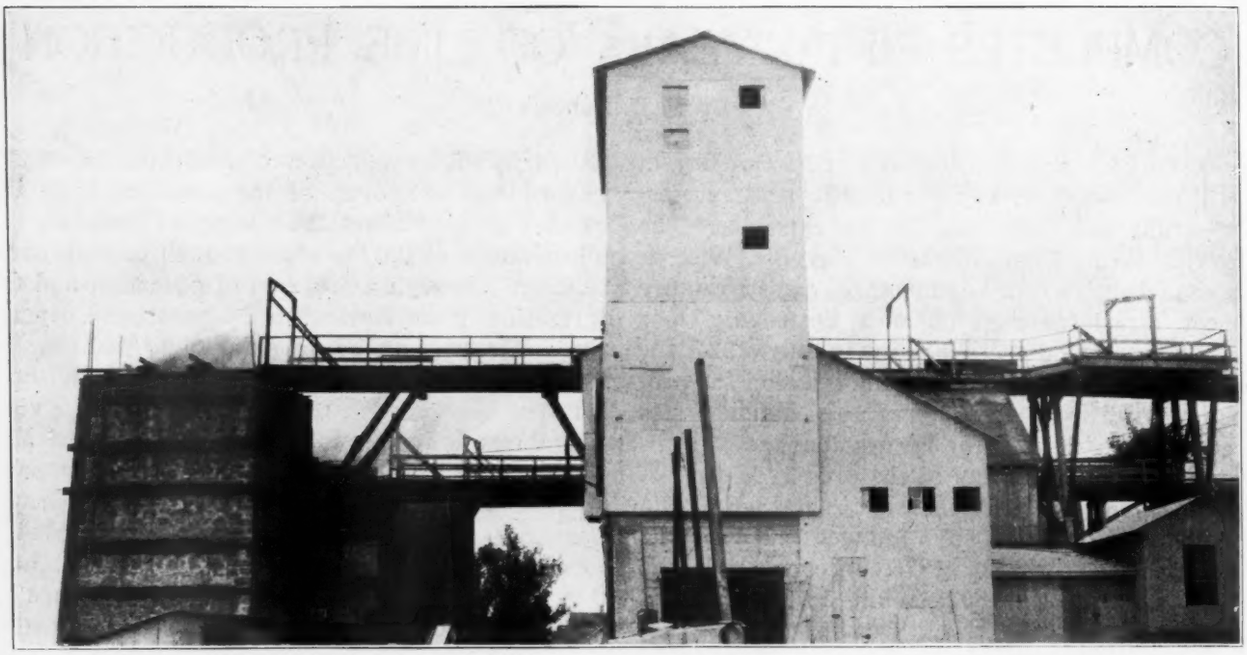
COMPLETES FIFTY YEARS OF LIME PRODUCTION

By E. D. Roberts

USUALLY it is considered a red letter day in the history of any business to pass successfully the 50th year of its existence. The Mayville White Lime Works of Mayville, Wisconsin, has this record. Although a disastrous fire almost devastated their business, destroying their kiln buildings and crusher plant in July, 1924, the current year has been their banner season for production. During the past year this company has produced and shipped the largest tonnage of agricultural limestone of any of the producers of Wisconsin. Charles H. Ruedebusch, Sr., father of the president of the company, founded the Mayville White Lime Works in 1876, incorporating the present company in 1891. While an incorporated company, the stock is still owned by the descendants of the founder, making it a family institution.

The Mayville White Lime Works manufacture agricultural limestone under the restrictions of a patented process, (the rights to this patent for the Central Western states being controlled by them) which, by the introduction of the proper amount of burned lime, removes all the moisture from the ground stone without the danger of changing the effectiveness of the material through possible overheating. Through a program of education and the formation of an Agricultural Limestone Cooperative Association with headquarters at Madison, the four principal producers of this product in Wisconsin: the Mayville White Lime Works of Mayville, The Western Lime and Cement Company of Milwaukee, The Waukesha Lime and Stone Company of Waukesha, and the Wissota Sand and Gravel Company of Eau Clair, are attempting to show the farmers of Wisconsin and the Middle West how they may increase the production of farm crops by the proper use of lime. Experiments made by governmental agencies have shown that over half of the land in Wisconsin needs lime to overcome the acidity of the soil, thereby making it possible to raise luxuriant crops of leguminous plants, which in themselves determine the need of nitrogen in the soil. Some crops abstract a great amount of lime

General View of Agstone Mill



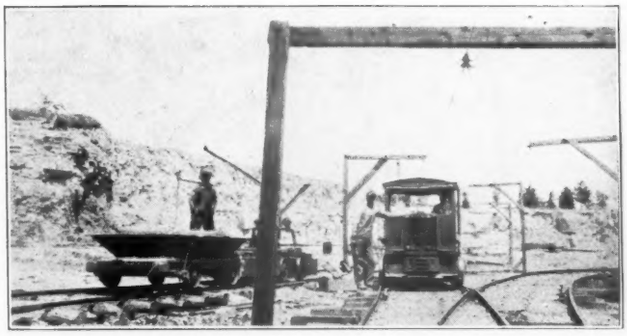
Agstone Mill Center With Kilns at Left

Electric Locomotive Conveying Material to Crushers

from the soil which, in the case of alfalfa, aggregate 100 pounds of lime in every ton of this crop.

Production of lime was maintained after the fire in 1924 by means of temporary platforms, etc., but the mill for the production of agricultural limestone, commonly called agstone, had to be rebuilt. A makeshift plant was installed after a while, ready for the beginning of the agstone season, which starts in October. This plant was operated throughout that season, and a new plant was constructed in 1925. This plant, designed by Carl H. Ruedebusch, the president and manager of the company, is small but very efficient being capable of producing 400 tons of lime dried agstone per 10 hour shift. It is the production of this agstone which makes this plant of special interest. To be marketed successfully, the stone must be ground and dried. If the production of this stone is made from the by-product of a lime plant, its disposal in connection with lime kiln operation provides a good profit. The Mayville White Lime Works has done everything possible to increase the production of this by-product, which, being a seasonal product, requires the building up of a surplus of quickly ground rock during the slack season.

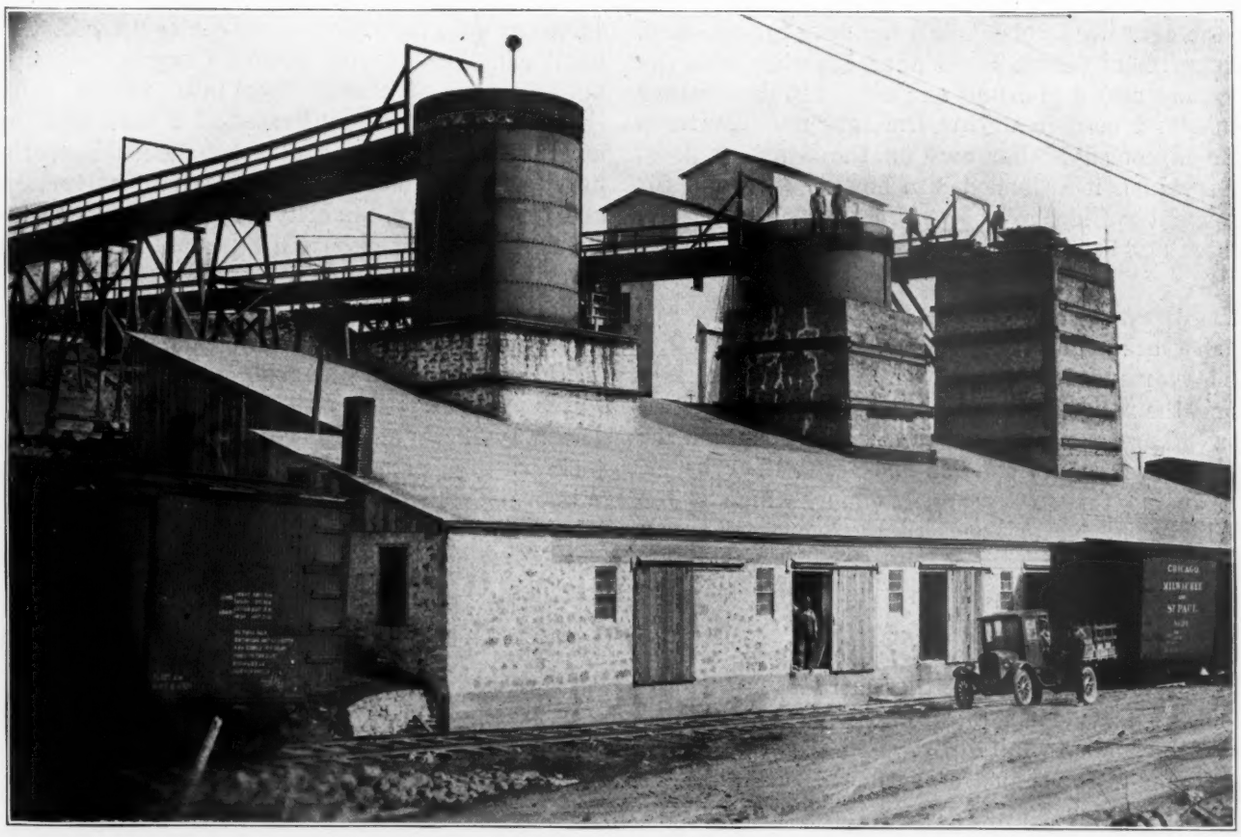
The following description of the plant operations will show, from the viewpoint of space used, that the main feature of this plant is the production of agstone, with lime as a by-product, which is unusual. The quarry is located on the high point of an 80 acre farm. Its location has made possible the hauling of rock by gravity even from the lower



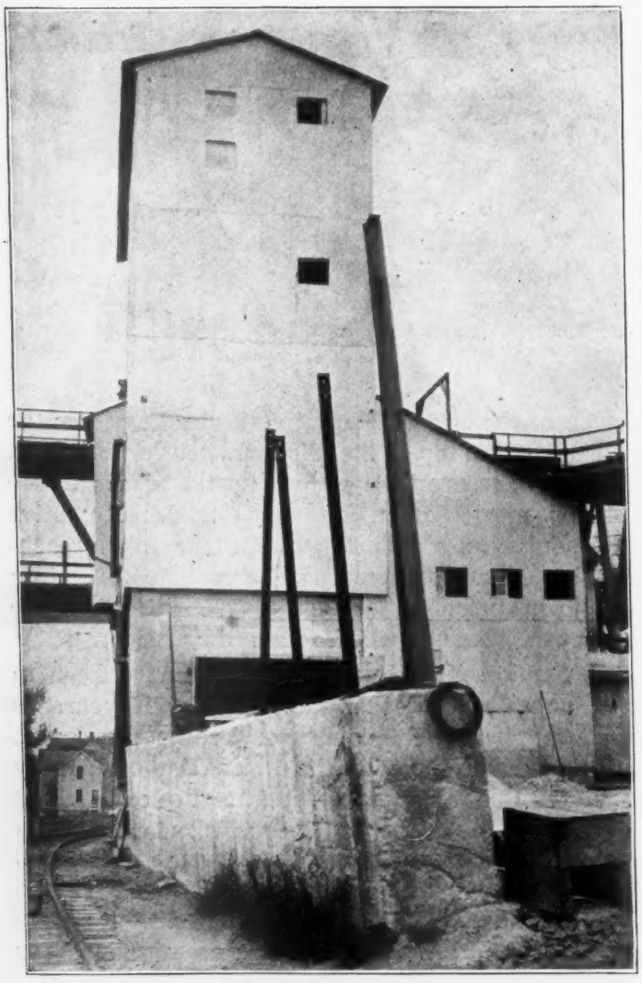
Electric and Gasoline Trucks in Yard

levels of the quarry, short trestles leading from the hillside to the top of the kilns and crusher building. The empties are then pushed up the tracks to the pit by means of a Baldwin electric locomotive traveling on a standard gauge track. After reaching the quarry, the empties are switched over to a Whitcomb gasoline locomotive for spotting at the various faces and loaded.

A Sanderson cyclone well drill, having been in continuous operation at the plant for 15 years, is used to place the Hercules or Trojan powder to break the rock out of the face. An electrically operated Buhl air compressor furnishes compressed air for the operation of Hardsoc Wonder drills, to break the large boulders left after the shots. All rock above 8 inches in size is loaded on cars and conveyed to the kilns and burned to produce lump lime. Three vertical shaft kilns are provided for this purpose. These kilns are provided with grates



General View of Kilns



View of Agstone Mill

at the drawing level to allow the fines to fall into a compartment below. These fines, together with the core, are placed in drums and hauled to the crusher house and used in drying the agstone. The lump lime is cooled in barrows on the drawing floor, after which it is loaded into box cars in bulk for shipment to Chicago or other outside points, a small percentage being shipped in steel drums on special order.

Local shipments of lump lime are made by two Nash trucks equipped with Heil dump bodies and Heil hydraulic hoists. After picking out the kiln stone, the residue is loaded into cars for the production of agstone. During the rush season all the spalls and fines are handled directly to the crusher, but during the spring and summer, which is the slack season for agstone, all the stones that can be handled on a fork are loaded into cars and dumped from a trestle into a lower level of the quarry where a tunnel has been constructed over which the spalls are dumped. These spalls are reclaimed by gravity during the rush season through openings provided in the top of the tunnel, which allow the spalls to fall directly into cars spotted on the tracks in the tunnel. The fines left at the face after forking are used to meet the demand for agstone during the slack season.

Whether loaded at the face or in the tunnel, the loaded cars are conveyed to the top of the crusher house by an electric locomotive and center dumped into a chute leading to a number 5 McCully crusher for the initial grinding. As each load is fed to the crusher, a percentage of burned lime (the screenings and core mentioned above) is added. This lime becomes thoroughly mixed with the raw rock and in time dries it. The McCully discharges the crushed mixed material into a hopper, from which it is drawn by a Weller feeder and discharged into an inclined bucket elevator, which carries the material to the top of the crusher building where it is discharged into an Allis Chalmers 54 inch by 20 foot revolving screen. This segregates the material into three grades; the two larger sizes are discharged directly into bins below, being suitable for concrete aggregates, and the fines are discharged into a hopper. This is provided with an opening in the bottom in which has been constructed a gate to allow the material to fall directly into the shipping bin at the right, or onto a Universal vibrating screen at the left. The fines from this screen are chuted into the shipping bin, while the material failing to pass through it is chuted into the bin under the second section of the screen.

Two Weller feeders, one under each of the bins containing the larger sizes of rock, draw it off and discharge it into two Allis Chalmers pulverizers. These pulverizers discharge onto a cross belt, feeding the material to an inclined bucket elevator which carries it back to the top of the building, where it is discharged directly into the revolving screen or onto the vibrating screen as desired. This plant can thus produce concrete aggregates or by pulverizing them convert them into agstone. While the pulverizers are only rated at 8 tons each per hour, 40 tons of aggregates have been converted into agstone in one hour by these two pulverizers, and for flexibility, quantity and quality of production, this concern may well be called a "big" little plant.

The general office of the company is at Mayville, Wisconsin, while the plant and quarry are located on the railroad and alongside a main paved highway 3 miles directly south of the town of Mayville. The Mayville White Lime Works also operates a rock crushing plant at Richwood near Watertown, Wisconsin, and the office of the company is maintained at their department store in Mayville. Mr. Carl H. Ruedebusch is president and manager president; Mr. E. F. Ruedebusch is secretary, and Mr. George F. Janssen, treasurer.

A reduction of $3,031.35 in medical costs and a reduction of $9,237.49 on compensation payments over the previous year has been reported by the Genoa, Ohio, plant of the U. S. Gypsum Company.

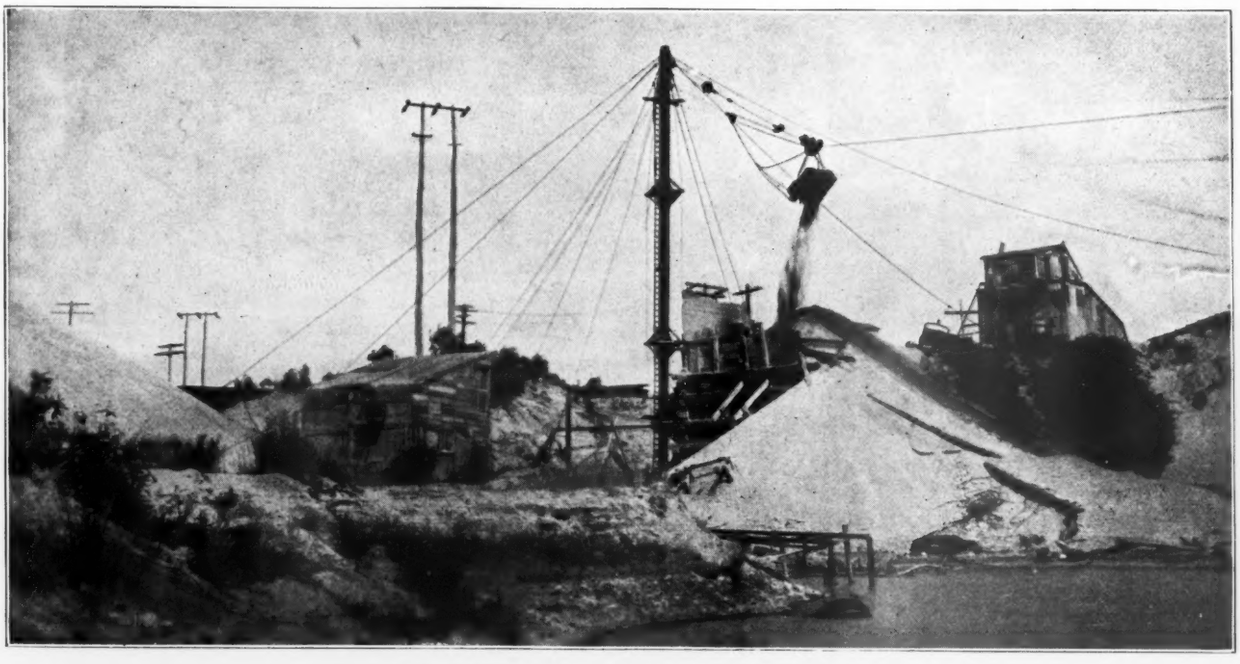
THE HIGHLAND SAND AND GRAVEL COMPANY OPERATES MODERN CABLEWAY PLANT

By F. A. Westbrook

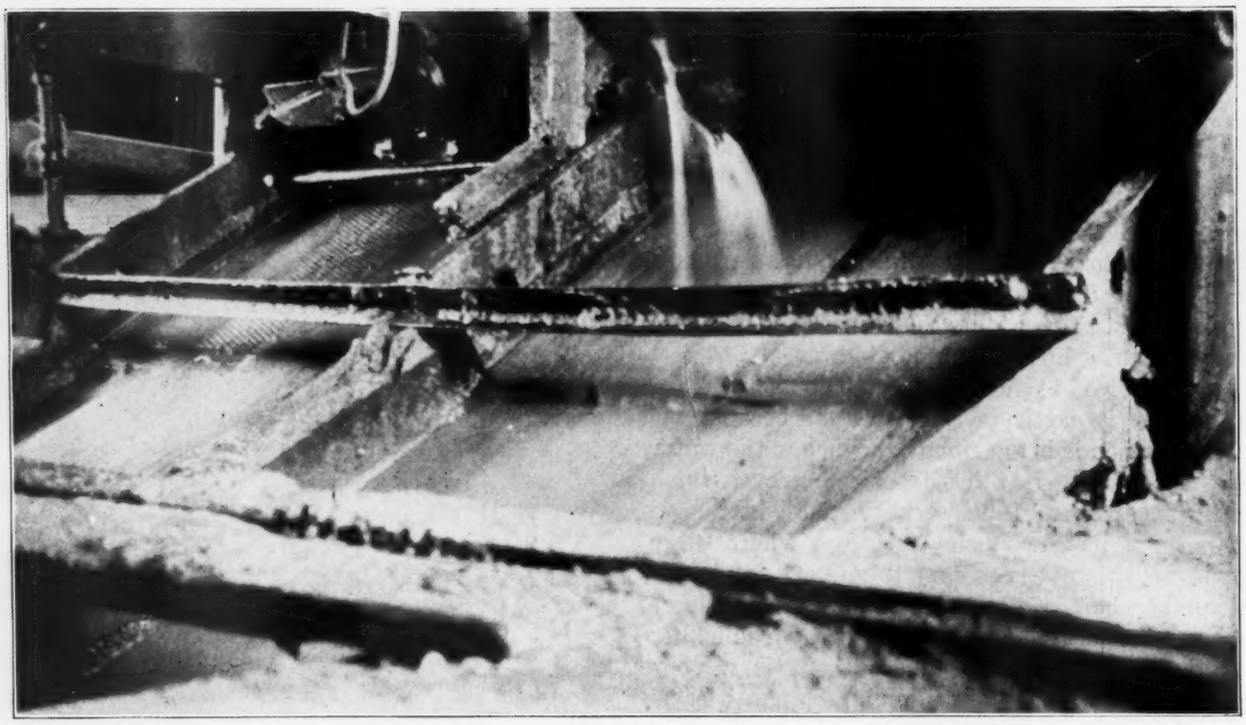
THE Highland Sand and Gravel Company of West Roxbury, Massachusetts, has a production of 800 to 1000 tons of sand and gravel per day, most of which is excavated by means of a Sauerman drag line having a cableway of 610 feet and a scraper of 1½ cubic yards. The operation of this scraper is particularly interesting because the material which is being removed is below the water line. There is a very thick deposit of gravel which lies in places about 100 feet above the water level and perhaps as much below. Except where there are ridges, it is not necessary to go very far below the surface before water is found. The result of these conditions is that some sort of hydraulicking operation is unavoidable unless there is a very large surface available or unless large quantities of very valuable material are overlooked.

Practically all the sand and gravel is produced by the scraper which works along the bottom of the pool and against the banks causing the latter to cave. Some of the illustrations show the drag line in operation. It is in use throughout the year except from about the middle of January until about the first of April during which period ice usually interferes with its efficient operation. For winter service, and also as auxiliaries to the scraper, there are two ¾ yard Thew shovels. One of these is gasoline driven and the other steam driven. As an example of the variety of service to which these machines may be put, a large pile of over-

Conveyor From Hopper to Scalping Screen



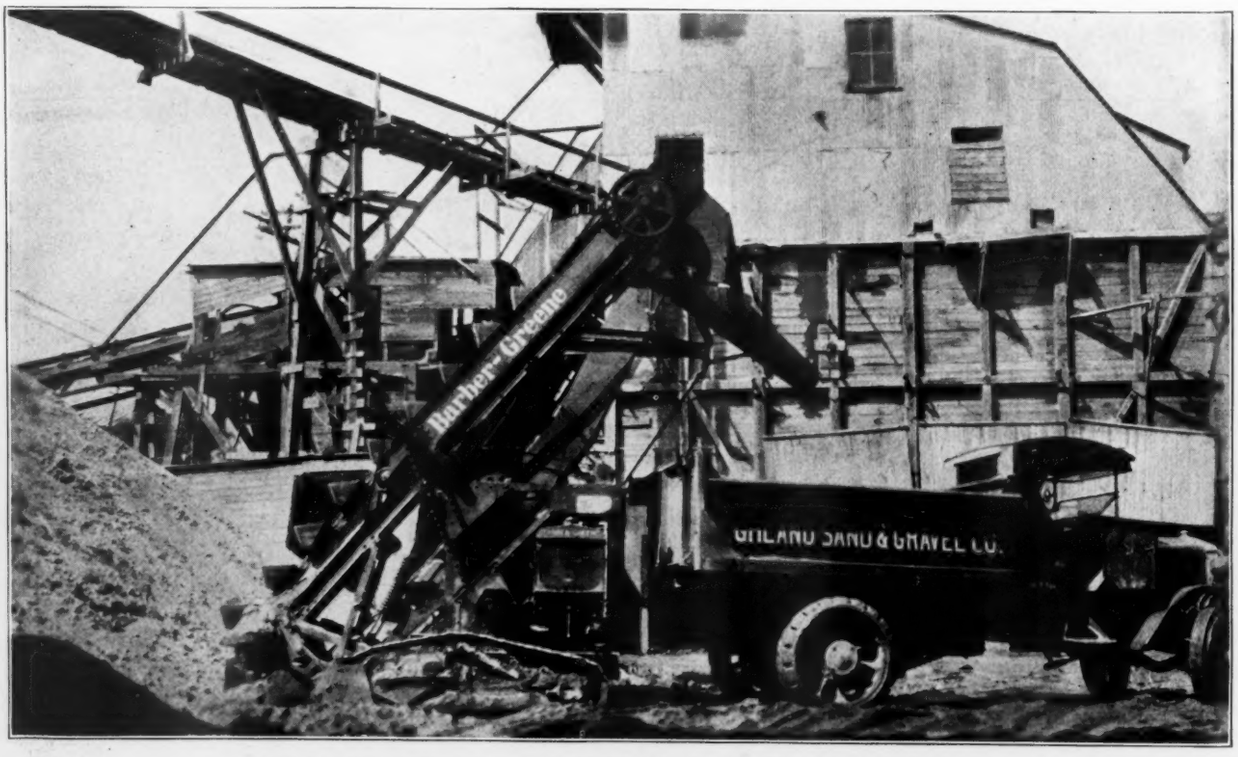
Drag Line Scraper Unloading Gravel on Pile



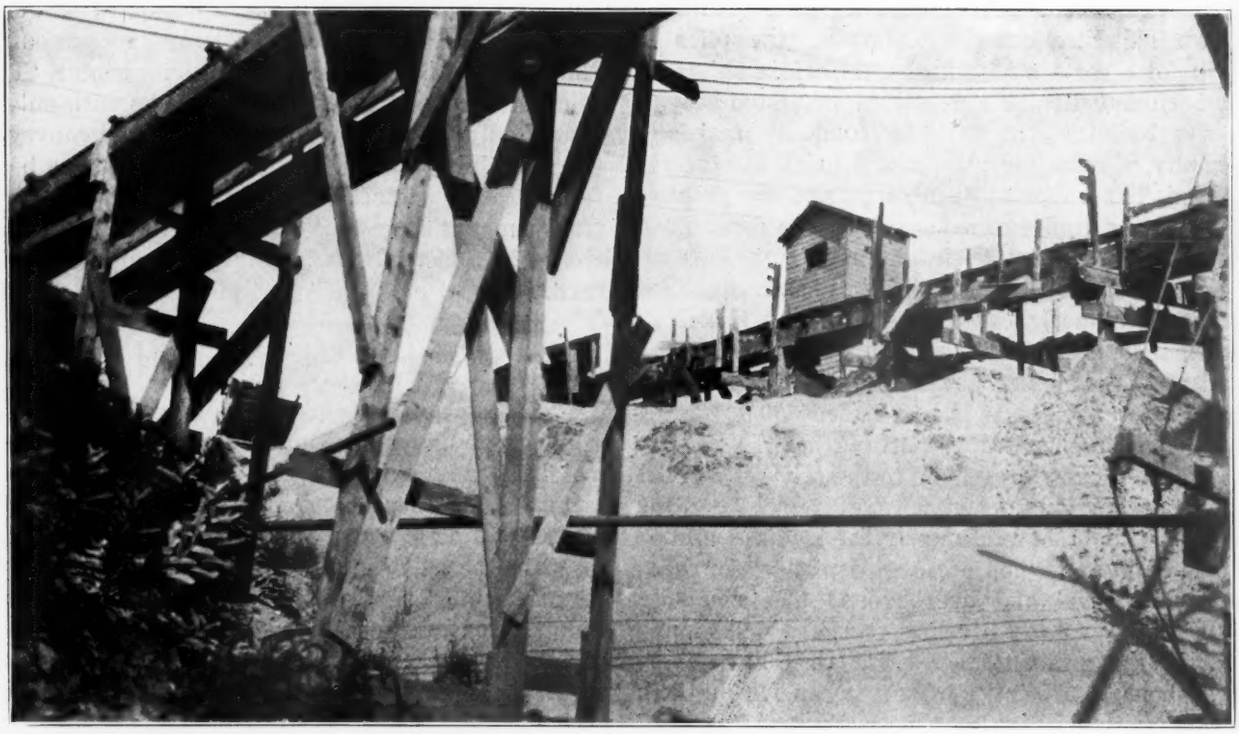
Woven Wire or Washing Screens

burden was loaded by the gas shovel into trucks for transportation to some land being filled in.

The Sauerman scraper, which travels on a Roebling wire rope, is run by a Mead-Morrison hoist, which is driven by a 125 h.p. induction motor, and is capable of taking out 700 yards in nine hours under favorable conditions. Where the deposit is very hard, the production decreases accordingly. The sand and gravel are first dropped into a hopper, as shown in one of the illustrations. From the hopper it is fed onto a 24 inch belt conveyor, fitted with idlers purchased from the Link Belt Company and belt from the Empire Rubber Company. This conveyor takes the material to a New England Roads Machinery Company scalping screen which removes everything over 2 inches in size. This size material drops into a New England Roads Machinery jaw crusher and then falls into a hopper.



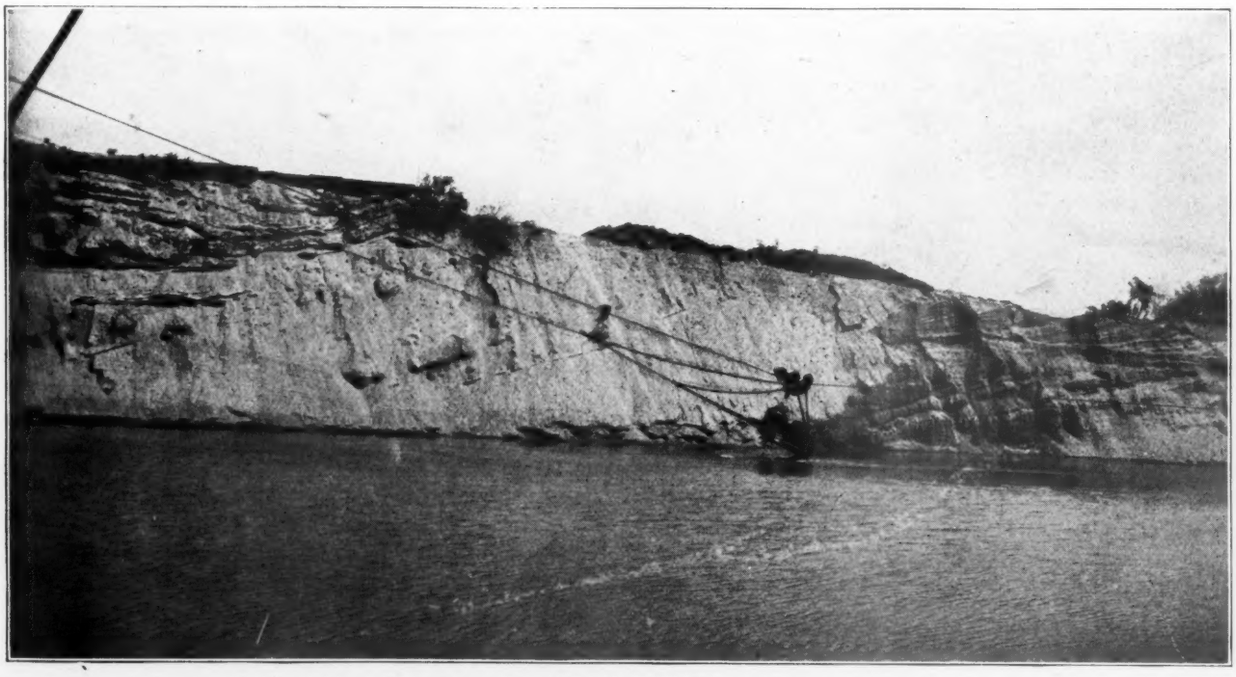
Elevator from Crusher to Screens and Portable Loader Handling Material



View of Conveyors and Storage Piles

This feeds the crushed stone into a 70 foot elevator which also picks up the commercial sizes from the scalping screen and deposits them on the washing screens.

The screens are of the Concap type made by the W. S. Tyler Company. The first screen has $\frac{3}{8}$ inch openings, and everything which does not pass through the screens go to the gravel bins and is not further separated for sizes. The next screens have $\frac{1}{16}$ inch mesh, and the material which does not pass through is taken by a conveyor to storage. The sand which passes through the screens is carried by the water into a Good Roads Machinery Company washbox. From there the sand is taken by means of conveyors, to one of two storage piles. The reason for two storage piles for the sand is to permit the wet sand to drain and dry somewhat in one pile while the second pile is being made. This drying of the sand is necessary because the building specifications in Boston are very definite with respect to the amount of water which is to be used in concrete, brick mortar and plaster. The sand



Drag Line Scraper Emerging from Water with Load of Gravel

must therefore be sold with a fairly definitely known moisture content. Allowing the piles to drain for a certain length of time before shipment has been found to be a greatly appreciated service to the building trade. The company makes a specialty of sand for plaster and brick mortar for which it has important contracts, and the practice of providing well drained material has done much to maintain this very desirable business.

Loading the trucks from the piles is accomplished by means of a Barber-Greene crawling loader as shown in one of the illustrations. Mr. West, the head of the company, speaks highly of the usefulness of this machine. It has loaded 500 tons in a day. The fact that the machine can be readily moved from one storage pile to the other is a great convenience and a practical requirement at this plant. While it is used mostly for loading sand, it is also employed when occasion demands, for loading grit, gravel and overburden. The company owns fourteen 5-ton Sterling trucks which handle most of the production. So far they have averaged about 50,000 miles of service and are still in good condition. Five of the trucks are equipped with Heil hoists and seven with Wood horizontal hoists.

Mr. West is a believer in having good equipment and is doing everything he can in the way of saving labor. However, this means that the machinery must be well cared for, both to prolong its life and to avoid interruptions and delays due to break downs. One of the most important means toward this end is proper lubrication and, to make sure that this is accomplished, one man is employed to see that all the machinery is kept adequately lubricated.

During the winter period the scraper cannot be used on account of ice; therefore the material must be taken by the shovels from a dry location. The company has such a location near the screening plant, where the shovels are used in winter. The sand and gravel are loaded onto trucks with only a short haul to a hopper which feeds onto a conveyor to the scalping screen. This arrangement has been found to be satisfactory for the comparatively small amount of material required during the few weeks in mid-winter when the scraper cannot be used.

Plan Course in Concrete Mixtures

Arrangements have been made for a short course in design and control of concrete mixtures for members of engineering college faculties, staff members, and those engaged in research work. The course will be given in Chicago from September 7 to 15 in the new building of the Portland Cement Association. There will be three hours each day spent in conference work, with afternoons devoted to laboratory sessions, field trips to large structural and highway jobs and cement products factories. The Association Research Laboratory with D. A. Abrams in charge will be available for the work of unusual value, and the results will be far reaching in bringing to those interested the latest information on advanced methods and the application of these methods to the job.

A Billion a Year

A billion dollars a year is now being spent in the United States for highways. Motorists are paying sixty-five per cent of this sum, it is estimated. There are more than 3,000,000 miles of highway of which about 500,000 miles are paved or surfaced and about 250,000 more miles graded and drained.

Gasoline Shovel Loading Overburden into Truck

THE ONLY RUBY RED GRANITE IN THE WORLD PRODUCED AT WAUSAU, WISCONSIN

By A. C. Edwards

MARATHON County, of which Wausau is the county seat, is located in the central part of Wisconsin on the Wisconsin river. In cutting its valley through the debris left after the glacial age, this river exposed several deposits of red granite which have been worked for some years by several concerns marketing what is called "Marathon Red" granite. It remained, however, for Anderson Brothers and Johnson Company, who own 120 acres in the center of the reddest of this red granite, to place it before the country as a distinctive product worthy of a nationally known name. Their quarry site, located near Granite Heights, a station on the Chicago and Northwestern railroad about 8 miles north of Wausau, produces the hardest of granite that takes a lasting mirror like polish. It is ruby red in color and suitable for the finest of monumental work. The quality of this stone is such that, assisted by a well directed sales campaign aimed toward the monumental dealers, the shipments of dressed stone from the Wausau dressing plant have gradually increased year by year to a total of over 14,000 cubic feet during the last calendar year.

This ruby red granite has experienced considerable upheavals, leaving the present bed with planes sloping about 30 degrees with the horizontal towards the southeast. It is broken in the other directions by cracks which have no evident system of conformity, producing many irregular shaped blocks of stone. This stone is broken out of the face by drilling a line of holes across the block with an Oldham air machine and completing the cut by plugs and feathers. The rigid inspection given the blocks to discover faults and cracks, together with the quarrying methods necessary to break out the stone and prepare it for shipment to the dressing plant result in a waste of about 75 per cent of the rock quarried and this is disposed of in waste piles on the quarry site.

Anderson Brothers and Johnson Company was organized in 1896 and incorporated in 1910. During all this time they have been developing this quarry until today they have what might be termed a well 300 feet long and 110 feet deep with a perfect working face 250 feet in length. As they have 120 acres of this formation, there is no likelihood that this company will exhaust the supply. They have just added a fourth derrick to the equipment of their quarry making this one of the best equipped granite quarries in Wisconsin. They also have the distinction of being the largest producer from the only known supply of ruby red granite in the world.

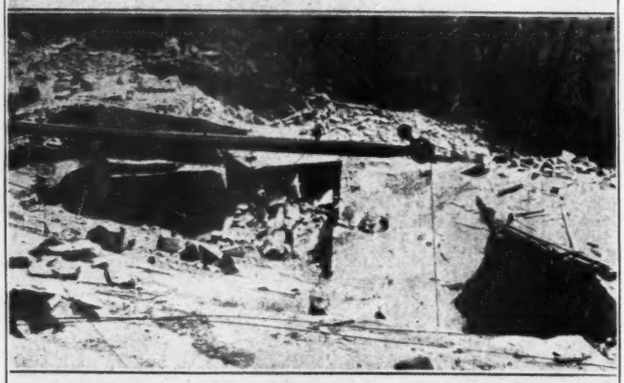
View of Two of the Derricks

The derricks are so situated that every foot of the quarry can be served in addition to covering certain adjacent areas outside of the quarry. The largest of these derricks, a Lane with a mast 120 feet high and a boom 105 feet long, was constructed from single pieces of Douglas fir shipped from Oregon. The derrick is placed on a concrete support resting on the side of the quarry slope opposite

View of Office and Plant

Quarry Floor Showing Present Working Ledge

Down 100 Feet. This Block Contains About 30,000 Cubic Feet



Derrick Service to Every Corner of Quarry

Another Big Sheet Ready for Service

Views Taken Down in the Quarry

the working face. This derrick is worked by a large electrically operated American Hoist and Derrick Company's double drum hoist with a separate slewing drum, which when revolving winds on one cable and unwinds the other cable. This slewing drum is operated by a 15 h.p. reversible General Electric motor while the hoist itself is operated by a 125 h.p. motor of the same manufacture.

The new derrick is operated by an American Hoist and Derrick Company steam powered hoist. The derrick has a 58-ft. boom and is so placed as to be of special service in disposing of the large amount of quarry waste. In operation the derrick picks up a skip of stone and sets it on a car traveling on an inclined track. The car is then hauled up the incline by a steam operated single drum hoist. As the car is equipped with a Lane automatic dumper, when it reaches the top of the incline, the dumper strikes a bumper, releases a catch and allows the load of rock to be discharged onto the pile.

Another derrick is employed to load out the stone and the fourth helps in disposing of the quarry waste by hauling up skips of rock out of the well and placing them on cars and by loading stone. These last two derricks are operated by American Hoist and Derrick Company hoists driven by electricity. The quarry is equipped with Leschen and Sons' Hercules wire rope. During the summer months the selected stone is hauled to the Wausau dressing plant by auto trucks operating on a contract basis. In winter, the stone is hauled to the railroad station at Granite Heights and shipped by railroad to the Wausau plant. The two loading out derricks mentioned provide ready dispatch of the outgoing material.

All hoisting machinery and equipment is adequately housed in substantial buildings equipped to provide for the special comfort of the workmen. For example, the large American hoist which operates the large Lane derrick is placed on a concrete foundation and has a commodious structure built over it. This building has three glass sides held in removable frames so that any or all sides can be completely closed or opened at the will of the operator. The new building housing the hoist which operates the new derrick also contains the Sullivan air compressor which furnishes compressed air for the drilling operations. This compressor is operated by a 75 h.p. synchronous motor through a belt drive.

The main building of the Wausau dressing plant covers an area of 60x304 feet, and is constructed entirely of brick. In addition to this building, there are two large outside storage areas served by overhead Pawling and Harnischfeger electric cranes, one at each end of the building, and a large stiff leg derrick. A spur track from the Chicago, Milwaukee and St. Paul railroad runs under the middle of

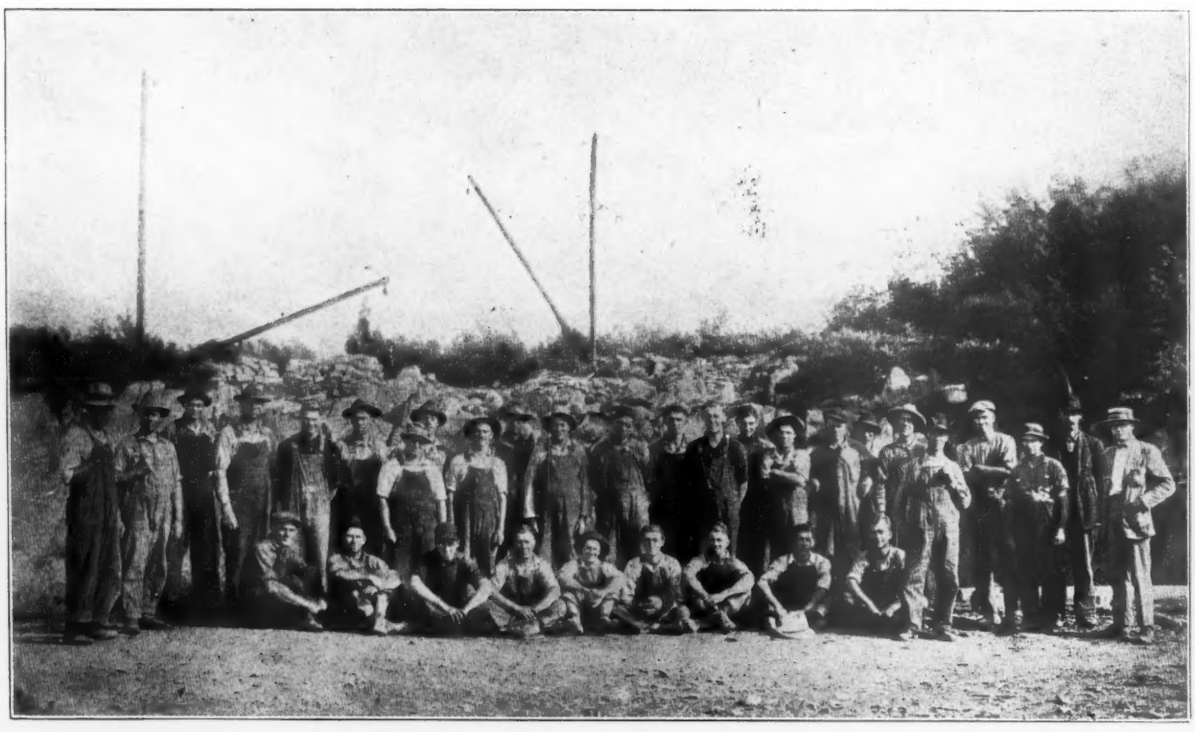
each of the outside storage areas and through the center of the main building, affording ample facilities for receiving and shipping the granite.

An overhead electric crane operating the entire length of the building serves the machines. There are seven polishing machines, a lathe and a sand blasting equipment in addition to air drills, cutting tools and other stone cutting and dressing accessories. The plant is operated on two shifts and produces 15,000 cubic feet of dressed stone annuall. Over 14,000 cubic feet of dressed stone were shipped in carload lots to dealers during the last year. Most of the stone is shipped in carload lots cut to specified dimensions to be decorated by the dealer, although a large amount of decorated stone is turned out on special orders and shipped to dealers. One of the noticeable features of this dressing plant is the complete dust collecting system which has been installed. This system, developed by the owners, is based on the principle of having the outlet as close to each cutting and dressing tool as possible. Other pipes are also arranged to remove the dust from the room. The dust is then caught in a collector in order to forestall complaints from the nearby inhabitants. Steam heat is provided to insure the comfort of the workmen during the cold winter months. A brick office located in front of the plant and trimmed with some of the ruby red granite adds to the attractiveness of the plant, and care is taken to have the premises clean and attractive to the public.

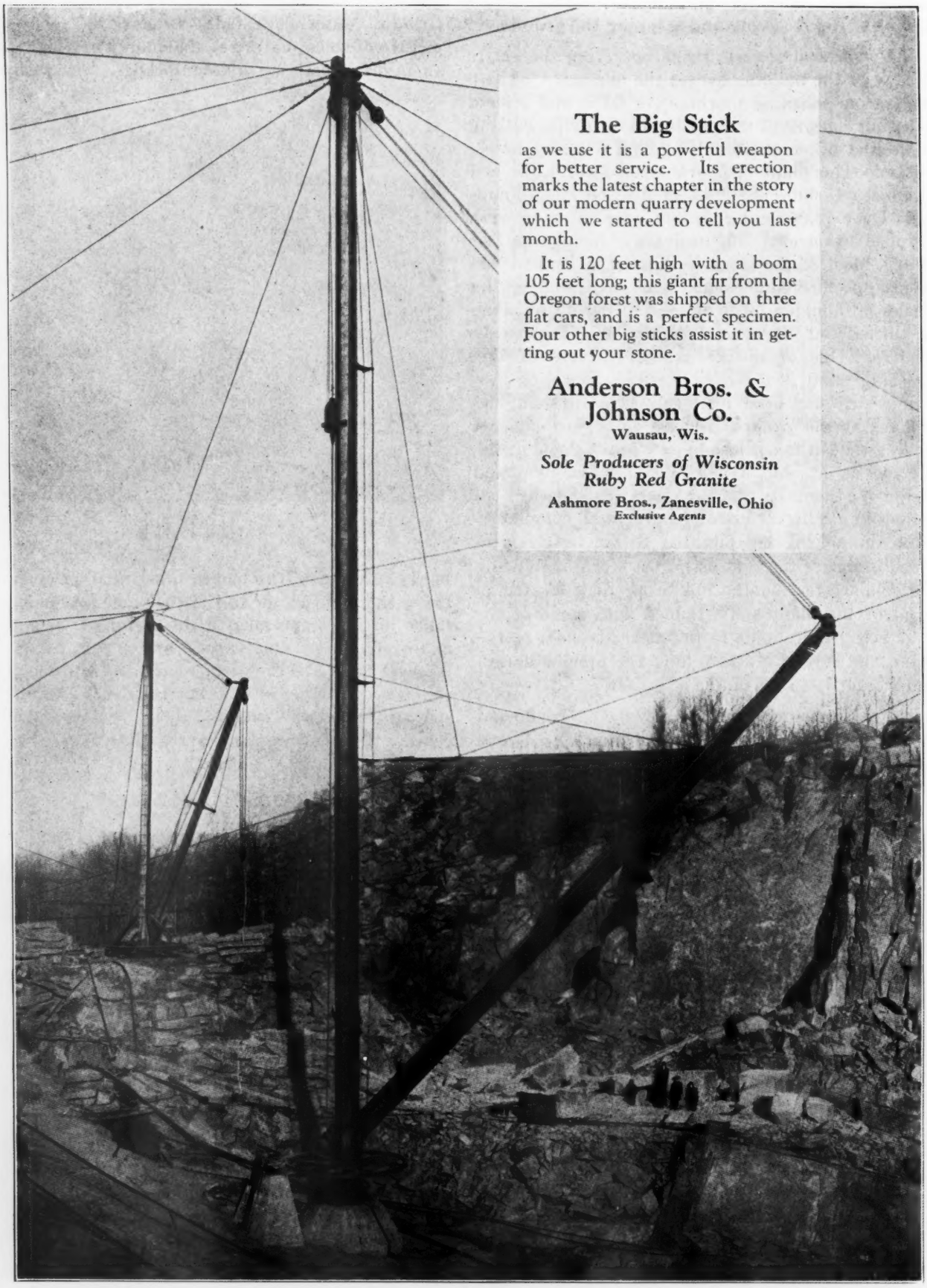
The advertising program now being conducted by the company deserves special mention. Every month a poster is sent out to the dealers describing in well directed sentences some operation in the quarrying or production of Wisconsin Ruby Red Granite Materials. This circular also shows a picture of some feature of the quarry or plant with an insert explaining its significance. The thought

Type of Granite Formation

back of this month to month illustrated letter is to bring the plant closer to the customer and make a more lasting impression upon him regarding the quality of the product as well as the care taken in its production and the permanence of the producing company. The present officers are: Gust E. Anderson, president; W. W. Walker, vice-president; Charles E. Johnson, secretary and treasurer; and Charles W. Johnson, manager.



Group of the Men Working at This Quarry



The Large Derrick Noted in this article. This is also a Duplication of one of the Advertising Circulars Referred to in the Article As Being Used by the Company

PIT AND QUARRY FOREIGN DIGEST

Development of Sillimanite Refractories for Glass

A process of weathering of clay-sillimanite mixture for six weeks improved the workability of the mixture and the bonding of the two costituents. As a bonding agent, Stourbridge O. M. clay gave the strongest bonding with the least soaking at all firing temperatures. Fine-grained mixtures most successfully withstood corrosion, and in a series of small pot meltings the only sign of glass attack was along the flux line. Details of the successful use of a sillimanite-fireclay (70:30) mixture as a pot-furnace siege are given. (W. A. McIntyre, J. Soc. Glass Tech., 1926, 10, 73-80.)

Ferruginous and Aluminous Cements

Ferruginous cements, consisting chiefly of calcium ferrites, $2Fe_2O_3,nCaO$, (n=5, 6, or 7), can be obtained by heating the raw materials (lime and e. g., pyrites cinder) together below the fusion temperature. These cements set slowly but are very resistant to attack by waters containing sulphates and alkalis. Ferro-aluminous cements consisting of mixtures of calcium ferrites, aluminates, and ferro-aluminates, are made in a similar way; by varying the proportions of ferric oxide or alumina, the rate of setting and also of hardening can be varied within wide limits. All the cements are very resistant to the attack of sulphates, and are suitable for reinforced concrete work in sea water. (E. Martin, Mon. Sci., 1926, v. 16, 97-101.)

Constitution of Magnesium Oxychloride Cement

In order to elucidate the constitution of magnesian cements the system $MgO\text{-}MgCl_2\text{-}H_2O$ was studied at 50 deg. in a special apparatus. The solid phases MgO, H_2O and $3MgO, MgCl_2, 12H_2O$ can coexist in stable equilibrium with solutions containing 14.01 per cent of magnesium chloride, whilst at 37 per cent the double salt and $MgCl_2, 6H_2O$, form the solid phase. MgO, H_2O can remain in unstable equilibrium with solutions containing from 14.01 to 20.95 per cent of magnesium chloride, above which only the double salt exists. Below 12.45 per cent the double salt decomposes, but it may remain in unstable equilibrium between 12.45 and 14.01 per cent of magnesium chloride. On the basis of the above results a formula for the calculation of the composition of various samples of cement is derived. It appears that ordinary magnesian cement consists of the double salt, magnesium oxide monohydrate, and solution. The proportion of the first constituent is fairly constant (57.8-61.8 per cent), that of the others varying more widely. The content of solution may attain 34.1 per cent. (T. Maeda and S. Yamane, Sci.

Viscosity Changes in the Reaction Between Magnesia and Aqueous Magnesium Chloride, and The Setting of Cement

The rate of increase of viscosity of mixtures of magnesium oxide with aqueous solutions of magnesium chloride was studied under various conditions, using modification of Ostwald's apparatus. The viscosity increases rapidly with rise of temperature and with increase in concentration of magnesia. The higher the temperature at which the magnesia used was calcined, the longer is the time required for setting. Greater concentration of magnesium chloride also delays setting, whilst the addition of sodium chloride or gelatin has little influence. In certain cases irregularities in the shape of the curve of increase in viscosity with time were observed, and these are shown to be due to supersaturation of magnesia in the solution and to crystallization of oxychloride, followed by colloidal hydration. From the results obtained it is concluded that in the setting of cements and plasters the liquid phase is supersaturated with respect to the solid, which crystallizes out in small aggregates, on which water is then absorbed. (T. Maeda, Sci. Papers Inst. Phys. Chem. Res., 1926, 4, 102-128.)

Weather Resistant Cold Glaze For Cement Blocks

If the surface need not be absolutely smooth, a mixture of cement, barytes, water glass and water is applied in a thin coating, allowed to dry and treated with diluted muriatic acid. The resultant coating is very resistant to atmospheric influences, and even to strong, warm acid solutions. (Chem. Zeit., June 23, 1926, 459.)

Manufacture of Water Glass

Gives manufacturing data for manufacture of water glass from sand, glaubers salt, soda and coke. (R. Deckert, Chem. Zeit., July 21, 1926, 525.)

Failure of Cement Sewer Pipes in Salt Bearing Ground Waters

Dr. K. Nehring first considers the phenomena in concrete due to atmosheric constituents after setting and hardening. The lime is converted largely to calcium carbonate which is more easily attacked. The cause of failure is the content of dissolved carbon dioxide in the ground water. The presence of magnesia compounds may have a contributory effect. (Zeitschr. angew. Chemie, July 22, 1926, pp. 883-887.)

A New and Cheap Cement for Floors and Walls

Frederick Greenbaum recommends magnesium oxide 60, sand 30, kieselguhr 12, clay 12, magnesium chloride 9, water 45 parts by weight. (Chem. Zeit.,

Papers Inst. Phys. Chem. Res., 1926, 4, 85-101.) June 5, 1926, 409-10.)

Dr. Walter Obst disputes the results obtained by Greenbaum. He contends that the excess magnesia acts as filler and is too expensive for that purpose. Also the products are weak, due to low magnesium chloride and excess water. (Chem. Zeit., July 14, 1925, 518.)

The Constitution of Cement

A brief discussion of the compounds present in ordinary, aluminate and ferruginous cement. (E. Jaenecke, Chem. Zeit., June 19, 1926, 446.)

Prodorite Exhibited

Chemical Plant Exhibition at London Congress of Chemists opened Monday, July 19, 1926, exhibited Prodorite, prepared from hard pitch and mineral matter which may be all siliceous (for resisting acid) or limestone aggregate and sand. The material may be used for covering floors, for pipes, roofs, cellars, roads, tank linings, etc. The resistance of the material to boiling water was demonstrated, and charts were shown of the results of the mechanical tests, which indicate greater strength than the best cement concrete. (Chem. Age., July 24, 1926, p. 81.)

X-Rays of Aluminium Silicates

The 3 polymorphic forms of $Al_2O_3.SiO_2$ (disthene, andalusite, sillimanite) are investigated as well as $3Al_2O_3.2SiO_2$ (mullite); also Al_2SiO_5 (comparable to Fe_2SiO_5) (pseudobrookite) was sought for. Author finds crystallized phase of mullite is $Al_2O_3.SiO_2$ and not $3Al_2O_3.2SiO_2$. (P. Rosbaud, Zeitschr. Elektrochemie, July 1926, 317-19.)

Manufacture of Burnt Building Materials from Clay

About 10 parts of a mixture (consisting of 200 parts of pulverized clay, 100 parts pulverized cryolite previously annealed in a furnace at 600 to 700 deg., 10 parts of iron oxide and 400 parts of water) are kneaded with 1,000 parts of raw clay. The mixture is cut into blocks and burnt in a tunnel kiln at about 800 deg. for 4 hours. The burnt blocks are crushed and about 50 parts by weight of the crushed material are mixed with 5 0parts by weight of clay, and the mixture is rolled, crushed and mixed again before being molded into bricks which are passed through a tunnel kiln and burnt at about 900 deg. (English patent 238,229 to H. Gronroos.)

National Crushed Stone Association Selects Detroit for Convention

Following the precedent established last year, the semi-annual meeting of the Board of Directors of the National Crushed Stone Association was held at the Ambassador Hotel, Atlantic City, on Friday, July 30, 1926. The meeting was exceedingly well attended, twenty-five being present from Canada, Texas and California, as well as from Wisconsin, Tennessee and other states east of the Mississippi river. The meeting was officially called to order at 10:15 a. m. with Chairman Graves presiding.

The first matter of importance to come before the meeting was whether or not the Association should establish a Research Associate at the U. S. Bureau of Standards, such associate to engage in research investigation jointly outlined by the Bureau of Standards and the Bureau of Engineering of the National Crushed Stone Association. The results would be written up in the form of a report by the research associate. This report would then be reviewed by the editorial committee of the Bureau of Standards and if agreeable to them would finally be published as an official bulletin of the Bureau of Standards. The Board enthusiastically approved this proposition and referred it to the Executive Committee with power to act when they felt it financially feasible to do so.

The question of establishing a testing laboratory in conjunction with the Bureau of Engineering of the Association was then placed before the meeting. This very important topic was thoroughly discussed and it was finally decided "that it is the sense of this meeting that we should bear in mind the ultimate establishment of a testing laboratory when the finances of the Association are such as to warrant this action."

The matter of placing the finances of the Association on a firmer foundation was then discussed and finally referred to the Executive Committee for a more detailed study, the results of which are to be reported back to the Board at its next regular meeting. Ways and means for increasing membership in the Association were considered, final action being left to the discretion of the President.

It was proposed that the President, Director of the Bureau of Engineering, Secretary and such members of the Board as could spare the time make a trip through the West for the purpose of meeting with and organizing crushed stone producers in the states west of the Mississippi river and to visit the capitals of these states for the purpose of effecting a more sympathetic understanding of the problems of mutual interest to the crushed stone producers and State Highway Departments. It was felt by those present that a trip of this nature would be very desirable and do much to stimulate interest and gain new members throughout the western territory. The matter was referred to the Executive Committee with power to act.

The selection of the 1927 Convention city next occupied the attention of the meeting and after carefully considering the advantages and disadvantages of the numerous suggested cities, it was decided to hold the 1927 Convention at Detroit, Michigan, on January 17, 18, 19 and 20.

A NEW INDUSTRY FOR SPOKANE DISTRICT

By Robert M. Gray

DURING the week of August 7th, the National Lime, Chemical and Mining Corporation was organized under the laws of Delaware, to engage in a general mineral production, and chemical by-product business, in the Northwestern States. The corporation was financed to the extent of $499,000. The officers of the corporation are: president, John K. Auld, Spokane, Washington, general contractor; vice president and general manager, Robert M. Gray, mining engineer and contractor; treasurer, J. T. Nelson, Spokane capitalist; secretary, L. R. Goble, general merchant, Spokane, Washington; assistant secretary, E. L. Glick, Spokane capitalist. Mr. Glick has been actively interested in the mining business for the past twenty years. The chief engineer of the corporation, Frederick Keffer, a mining engineer of national reputation, formerly professor at Ohio State University, is also interested financially. General counsel of the company are former Senator George W. Shaefer, who is actively interested in the corporation, and Charles H. Ennis, both of whom have been in active practice as attorneys, and interested in the mining business for more than twenty years.

The corporation owns the Indian Mine, near Dennison, Washington, which is a large, if not the largest deposit in the world of pure crystaline silica. This material which has been variously estimated at from five to twenty million tons, is consistent in purity of 98.3 per cent with practically no iron deposit. It is a huge granite mountain and geologists cannot account for its presence.

The deposit has no overburden, and no stripping is necessary; the moss covered rock is exposed with a few exceptions and can be quarried, rather than mined, at a cost of 45 cents per ton. It is four miles from the village of Dennison, on the Great Northern Railway and fifteen miles from Howard and Riverside, the center of Spokane. It is about three-fourths of a mile from a paved highway running between Spokane and Dennison. Plans were approved by the board of directors, for equipping the property with an air compressor, steam power with automatic oil burners and feed water pumps, Burley type quarry drills, a drag line outfit and suitable bunkers for handling the material. It is estimated that the material can be placed in the bunkers for 15 cents per ton, in addition to the quarry costs. Estimates show that it can be quarried with a powder expense of 5 cents per ton, and that 30 per cent powder is the most effective means for blasting the material.

Plans were also approved for the erection of a 100 ton mill, equipped with an air separation system, and a Bates packer. The mill will be located at some point on the Great Northern Railway, and will be equipped with a primary jaw crusher, with two sets of rolls as the secondary crushing equipment. The material will be classified as quarter and half inch materials, one, two and three sands, with the balance of the material running through

View of Silica Deposit Quarry

two ball mills manganese lined and equipped with Ding magnetic separators. Arrangements have been made for the greater part of the necessary equipment, and it is expected that it will be on the ground by the 25th of September.

The company is, at this time prepared to furnish on a small scale, various grades of silica sands and crushed materials, but will not be able to furnish the finer grades until the completion of the mill, and the establishment of central warehouses. Silica rock can also be furnished at this time. In fact, the quarry has furnished a large tonnage of rock in the past to Pacific Coast points, including Vancouver, British Columbia.

Ground material to be furnished, will be from one hundred to three hundred mesh, and packed in 50 pound valve bags, which seems at present the most convenient manner of handling the material. However, it is possible that a considerable portion of the output will be packed in paper lined barrels for certain trade, if it is found that this package be found satisfactory. Power will be generated by steam, through the use of direct connected generators, and all machinery will be run by motors, the idea being to avoid the use of belts and shafting as much as possible. Negotiations are under way, for the establishment of a central warehouse at Wilmington, Delaware; San Francisco, California, and some Gulf port, and to take advantage of all water transportation possible. Present plans indicate that the plant will be in operation by the first of March, 1927.

The corporation will also equip and place in operation, a deposit of high calcite lime, which averages throughout the deposit around 98 per cent pure. This deposit is located in Pend O Reille County, Washington, near Ione, close to the Chicago Milwaukee & St. Paul Railway. Plans for development include the installation of a tramway, the erection of York kilns, the installation of a Schulthess hydrating machine and Bates packing equipment.

The equipment has been purchased, with the exception of the tramway, and doubtless this will be taken care of in a short time. It is not planned however, to have the lime operation fully under way, before July, 1927, in view of the fact that the deposit is being prospected to ascertain its full extent, and the work is badly hampered by reason of a dense growth of fir, tamarack, hemlock, spruce and cedar timber now on the land. During the first operation of the plant, cord wood and saw-mill waste will be used as fuel. When the operation justifies, a producer gas equipment will be installed. The proposal of installing waste heat boilers has been considered, but in view of the scarcity of information relative to the performance of these units, no definite action has been taken relative at this time. It might be of interest to say that the corporation is also the owner of one of the largest deposits of Barium Sulphate in the west. This deposit is some five feet in width and has a known length of 6000 feet. It has been stated though, without any confirming information, that the deposit goes to a depth of 425 feet. The deposit lies apparently between dikes of diorite and granite and this would probably signify great depth. The fact is, that there is enough barite in sight to supply all known needs for several years.

View of Country Near Silica Deposit Quarry

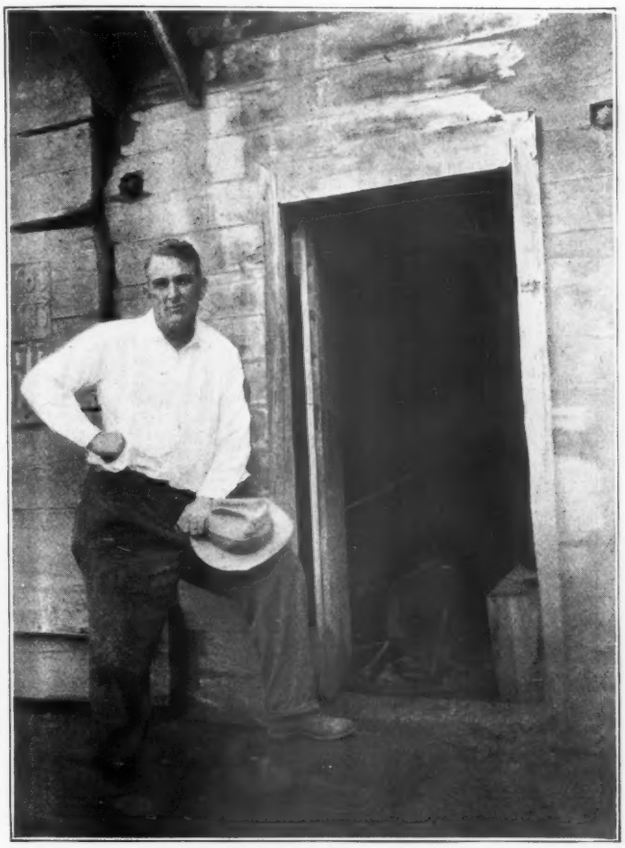
THIS OHIO SAND AND GRAVEL PLANT TYPIFIES RAPID DEVELOPMENT

By Charles A. Breskin

FROM a small tipple operation, with hand shovels and later an old scraper used to excavate sand and gravel, William H. Barber, built his present sand and gravel plant of 500 yards daily capacity. True, the plant isn't a pretentious affair, for its growth was so fast that little time could be spared for re-design. It was just added to from time to time, the increase in investment over a short period of five years being more than ten times that of the original investment. Even with so phenomenal a growth, and notwithstanding the fact that the plant is not a pretentious affair, the operation is very efficient and enjoys an excellent business.

The property, when obtained in 1921, consisted of 14 acres of sand and gravel land in the little Miami valley of Cincinnati. From the humble beginning of hand shovel and scraper the operation has grown until today two 10-ton Northwest cranes, equipped with one-yard clam shell buckets are employed for excavation. One of the cranes works on top of the bank for stripping overburden while the other loads direct into a 6-yard side dump car which delivers the material to a track hopper at the plant. The car is hauled to the plant by a two drum hoist and the return to the pit is by gravity.

The operation consists of two plants, one for dry

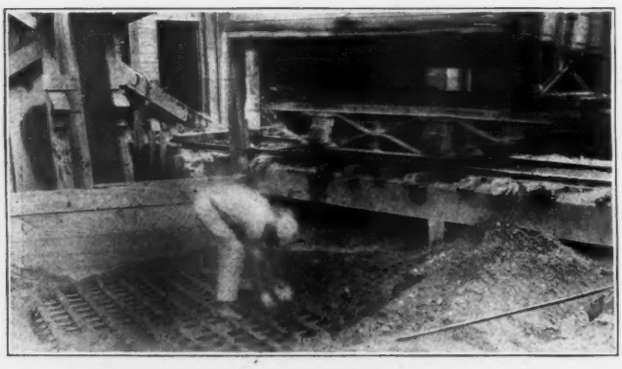


William H. Barber

General View of Gravel Pit

screening and one for wet. The units are run separately and only one at a time. The material going through the trackhopper is reclaimed by a 54 foot centers Jefferey bucket elevator which discharges to a 3x4 foot trommel screen, fitted with 2 inch openings. The trommel screen is in the dry screening unit. The oversize from the trommel, 2 inches and over, is taken out and sent to a number 3 Gates gyratory crusher. The material 2 inches and under is sent to a number 6 "Rotex" screen, which is located directly under the trommel.

Rotary Scalping Screen



View of Track Hopper

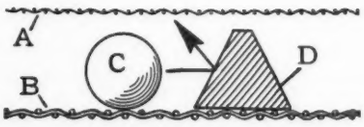
Chute and Conveyor Which Carries Gravel from Screen to Bins
Nature of Deposit. Crane is Used for Stripping

Nature of Deposit. Crane is used for Stripping

The Rotex screen, which is manufactured by the Orville Simpson Company, has been in use over three years at this plant. It was originally installed to remove 25 per cent of the sand from the bank gravel. Two separations of sand are made with the Rotex, the screen handling 15 tons of material per hour. The screen has a patented system for keeping the sieve cloths from clogging. It consists of a large number of rubber balls arranged so that the motion of the sieve causes them to strike beveled partitions and jump sharply upward against the under side of the sieve cloth. The balls strike practically the whole sieve surface when in motion. The screen has a level, circular or hand riddle motion and has the effect of floating off large particles of trash, sticks, etc. The drive head of the machine is totally enclosed and is mounted in ball bearings.

At the Barber plant the Rotex has two sections of screen cloth, number 4 at the feed or head end and number 4½ at the discharge end. Inasmuch as most of the screening takes place at the head end it has been found that this arrangement materially increases the life of the screen cloth, which now lasts for 60 days or better. The fines from the screen discharge direct to the bin below while the oversize is discharged to a small belt conveyor, delivering to bins. A small amount of water is used in connection with the sifter, as the bank sand

Main Sizing Screen in Crushing Plant



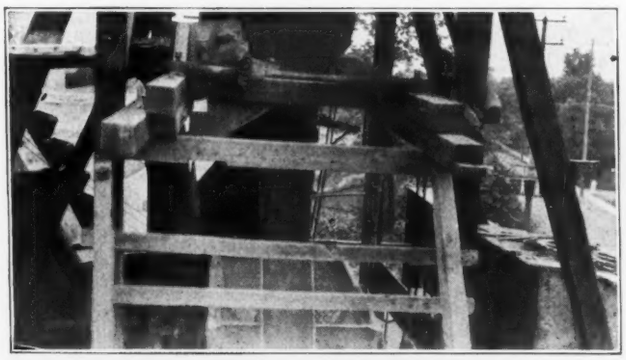
Diagramatic Sketch of Rotex Cleaning System

A—Sifting Cloth. B—Coarser, ball supporting screen. C—The ball flying about under the rotating action of the screen hits the inclined surface D and is deflected upward, hitting the sifting cloth.

contains considerable moisture and water proved beneficial to the efficiency of the screen.

When it is desired to operate the wet unit, the discharge from the trommel is directed to a chute discharging to a 22 foot centers bucket elevator. The elevator discharges to a 4x20 foot sizing screen, and the first 4 foot section is utilized as a scrubber. The second section is 7 feet and has a 5/16 inch jacket. The material passing through this section is diverted to either or both of two sand settling tanks. The third section of the screen is provided with 1½ inch perforations. The trommel screens and sand settling tanks were built by the Littleford Brothers Company.

The entire output of both units, 500 yards per day, is delivered by truck. The company operates a fleet of 6 of which two are White's, two Shaak, one Mack and one Armleder. Only 14 men are required to operate the entire plant, including the truck drivers and the men on the cranes. The products of the plant include three sizes of sand, and three sizes of gravel, ¼ to ¾ inch; ¾ to 1¼ inch, and 1¼ to 1¾ inch. The present deposit of sand and gravel has been worked consistently and Mr. Barber estimates that in 3 or 4 years the deposit will be worked out. To provide for that contingency he has secured another deposit of sand and gravel consisting of 45 acres of land.



View of Trommel and Screen

View Showing Office at Right, Plant at Left

New Maine Cement Plant to Start Construction Next Spring

The lime plant of the New England Portland Cement and Lime Company, Thomaston, Maine, is now nearing completion. The kiln linings are being finished and it is expected that lime production will begin some time during the month of September. Up to the present this company have devoted all their energies to the building of a plant for the production of lime. However, according to a statement by Frank H. Smith, president of the Lawrence Portland Cement Company, work will begin here in the early spring to establish a cement plant.

The Lawrence Portland Cement Company which now comes to the fore in this industrial development for the state of Maine has a capital stock of $3,600,000. The home office of the company is in Northampton, Pennsylvania, but the plant, with a present output of 2,500,000 barrels a year is located at Siegfried, Pennsylvania. The plant was established in 1889, but prior to that was the Lawrence Cement Company which had been manufacturing or importing since 1832. The present trademark of the Lawrence Company is "Dragon" Cement.

The proposed plant will represent an investment of $4,000,000. Plans and specifications will be made during the winter. The plant will be of the most modern design with a production capacity of 1,000,000 barrels a year and estimated employment to 350 persons.

The company have holdings in the vicinity of New County road and on the water front of approximately 1000 acres where the plant will be built. This property is in a good location for shipping and the land contains unlimited quantities of the raw material used in the production of both lime and cement. It is estimated that the work of building will take from a year to fifteen months, for a two-kiln plant, the production of which would be from 600 to 1800 barrels a day.

The wet process will be used which requires larger kilns than the dry process, the diameter being 10 feet and the length ranging from 175 to 250 feet according to the idea of the engineers. Other equipment will be in keeping with the high grade kiln construction, namely: raw grinding, finishing, storage silos, bag packing, bag storage, gypsum storage and the building to house the electrical apparatus. The plant buildings will be of steel and concrete. The estimated cost of the plant is $4,000,000. Dragon Cement will be manufactured at the Thomaston plant, and on a basis which will analyze the same as the Lawrence product.

Urges Michigan to Sell Cement Plant

The Michigan Manufacturer and Financial Record carried an interesting article dealing with the state cement plant at Chelsea, Michigan, in the issue of August 14th, which is particularly significant because it is reported that the Newago Portland Cement Company through its representative, J. B. Johns, has offered the state administrative board $700,000 for the state cement plant at Chelsea. The price offered includes land, buildings and equipment. The inventory price of supplies would bring the purchase price to probably $1,110,000, according to the state budget director, Henry Croll, Jr. The state purchased the plant minus improvements and supplies for a reported equivalent of $500,000 some time ago. The article in the Michigan Manufacturer and Financial Record was as follows:

Entirely apart from the controversy which has arisen concerning the profitable or unprofitable character of the state cement plant near Chelsea, the purchase of which was undertaken by the state administration for the express purpose of regulating the price of cement used in concrete state roads, the newest incident in its history furnishes an opportunity for action regarding it, of which advantage should be taken.

It is not a question whether the state can make cement cheaper than anybody else or not. It is not a question whether the state can profitably use convict labor for this purpose. The principle of industrial trading by a government is involved.

The state of Michigan has no more business making cement in competition with citizens and corporations which employ free labor and pay taxes to it upon their plants than it has in going into any other line of commercial business. This paper has always maintained that such competition with private adventures in the cement-making trade, and with the free labor employed by them, is an unfair competition which should not be set up by the state. Now that an apparently competent bidder is offering to purchase the plant from the state at a price which seemingly justifies that which the state paid for it, and that will let the state out whole, it would seem to be the part of good administration to end state participation in such industrial enterprise.

It cannot be maintained that such a state industry is justified by the necessity of controlling prices. The law of supply and demand will continue to operate regardless of any state intervention in industry. If the manufacturers of cement were, conceivably, to enter into a combination harmful to the public interest as a result of its effect upon prices, there is ample law, both state and federal, to correct that evil without setting up a new competition with them.

As a matter of fact, the cement industry has had very great demands made on it during the past few years, so much so that it has apparently been kept going at full capacity, so that the impinging of demand upon supply must necessarily have had an advancing effect upon price. The fields of construction operations in which cement is used as a building material have been both enlarged and multiplied within the past few years. The relatively small capacity of the state's own industry can have had very little effect upon the market.

Such state investments are never satisfactory, because no figures presented concerning their operations are ever given the credit of being exact; a condition which has a tendency to throw doubt upon every figure presented by the state relative to its operations. It therefore seems the part of wisdom for the state to get rid of its uneconomic adventure, whether its financial history has been satisfactory or not.

Increase in Purchasing Power

Statistics given out by the National Industrial Conference Board, New York City, show a growth in population during the past five years which has been interpreted in terms of national purchasing power as more than five billion dollars. The population increase during the years 1920-1925 is 10,229,000, or 15 per cent more than the population of Canada; 38 per cent more than the 1920 population of all the New England states; and 15 per cent more than the population of the mountain and Pacific states. The estimate of increased purchasing power is based on the latest accepted calculation of average annual earnings of gainfully occupied persons. This increase in population means an increase in consumption and hence in markets. The data assembled by the National Industrial Conference Board indicates a wholesome condition for our national industrial life.

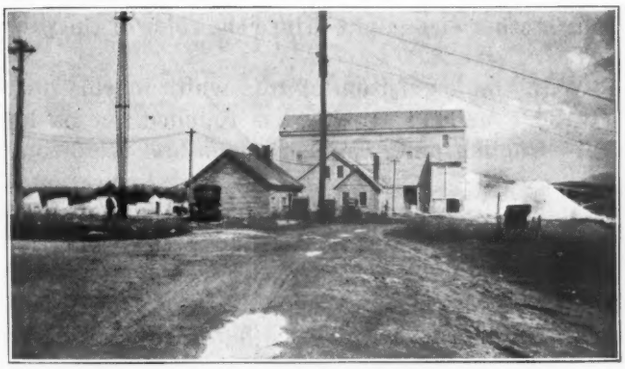
Measures Sound

There has been much thought devoted to the study of measuring sound transmission during recent years. In the construction of auditoriums the essential matter is the relative sound absorbing properties of the materials used. The Bureau of Standards in a recent publication gives some valuable data on the subject of measuring the sound absorbing properties of various materials. Only a square foot of the material is used for the test. In the construction of hotels and apartment buildings the opaqueness to sound of the partition walls is important. The publication of the Bureau of Standards gives the results obtained in their tests on some building materials ordinarily used. There was wide variability in the material, some tests showing material capable of reducing sound to complete inaudibility while others showed only a slight reduction of sound.

BRANDON CORPORATION DECIDED TO CRUSH

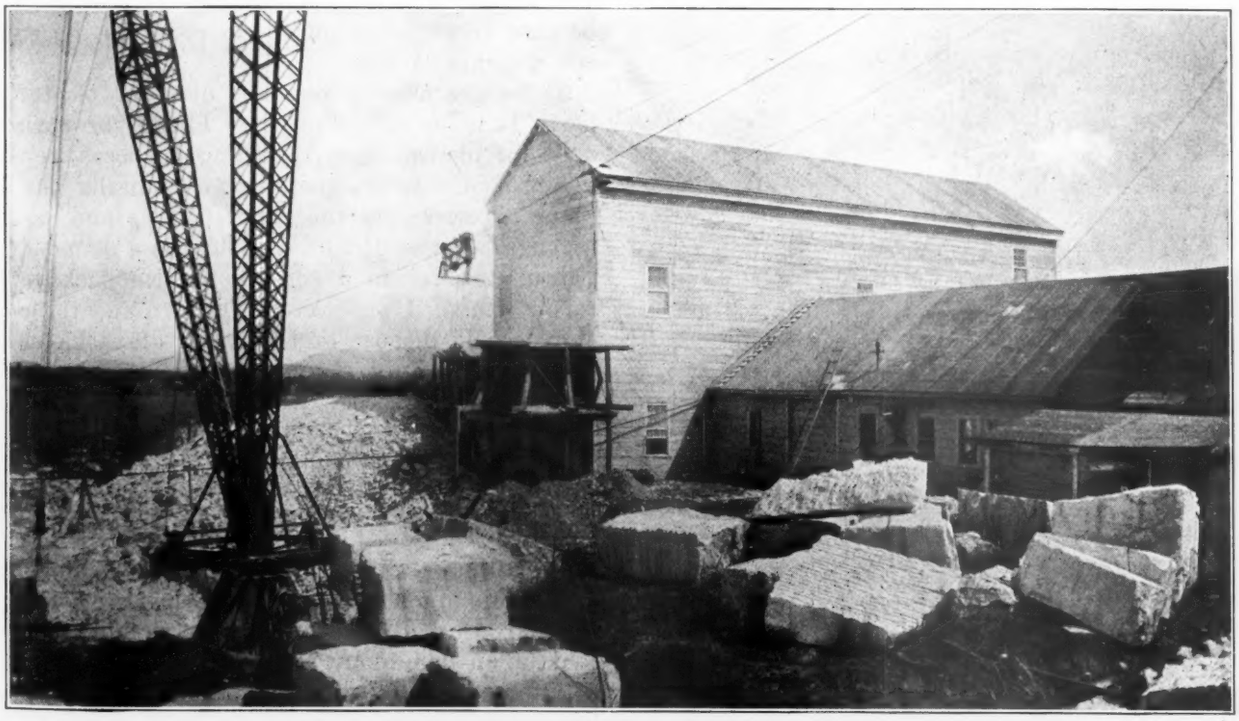
THE Gordian knot of obtaining dimension size stone from the beautiful white marble deposit near Middlebury, Vermont, has been cut by the Brandon Rock Products Corporation. Instead of laboring with infinite care to prevent shattering, this company dumps it into a crusher. However, some blocks have been recovered and these are used chiefly for statuary. The plant is producing a superior type of white granite for terrazo and stucco dash which is especially adapted for public buildings, hospitals, railroad stations, etc. For this product the more fragmentation the better, and the problem which has in times past caused infinite worry for many quarrymen is solved. The texture of this stone is the same as the famous White Carrara Italian marble and it is claimed to have no equal for terrazo floors. It is absolutely nonabsorbent.

The quarry, which is a pit, is worked with Sullivan and Ingersoll Rand jack hammer drills run by air from an Ingersoll Rand compressor. One man stone is loaded into two ton steel skips and hoisted by a swinging steel derrick. An aerial tramway, made by the Gray Foundry, Inc., carries the skip to an Allis-Chalmers Gates type K-5 crusher. The crushed material is taken by a Sturtevant bucket elevator up to a rotary screen. The oversize is returned to the crusher while the fines go by elevator to the finishing screen. The one inch material goes into a storage bin and is fed automatically into a large set of Sturtevant crushing rolls. These rolls discharge to the finishing screen by the way of a Sturtevant elevator. The fragments retained by the screen are sent back to a set of smaller crushing rolls and returned to the screen again by the elevator. The sized material is stored in bins above the bagging room. Because of the whiteness this material has to be shipped in 100 pound bags.



General View Office and Mill

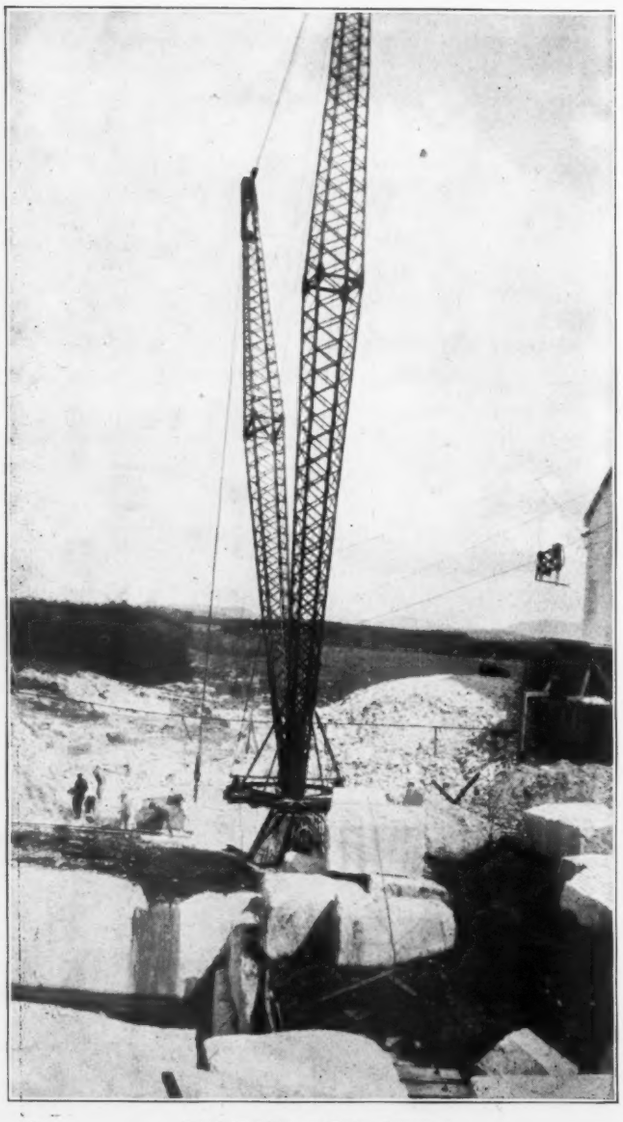
A View in Quarry and Derrick



Derrick and Stone Finishing Plant

At present all the fines are wasted, but the Brandon Rock Products Corporation which purchased the quarry only last year from the Middlebury Marble Company, expects to find a market for this and will install a suitable fine grinding plant when necessary. The plant is electrically operated by three General Electric 50 h.p. motors and at the present time produces about 100 tons a day. The current is purchased from a public service corporation. The electric operation does away with dirt which otherwise might injure the color of the product.

With the acquisition of this white marble quarry the Brandon company has rounded out its line with English pink, English cream and Middlebury white as its leaders. The concern's operation at Brandon, Vermont, where a yellow tone marble is produced for stucco dash and terrazo was described in January 1, 1925, number of Pit and Quarry. It is considered possible that some dimension marble may be produced here, however, as the deeper the work progresses the tighter the vein becomes. Substantial quantities of blue, green and pink are also found here, and the supply is believed to be practically inexhaustible. William Rockwell, of Brandon, is president of the company and has direct charge of the quarrying operations. E. C. Rockwell, vice-president, has charge of the concern's New York office and E. A. Bellmore, of Brandon is secretary-treasurer.



Looking Down Into Quarry

Gypsum in Packages

Popular demand is undoubtedly ahead of agricultural gypsum, gypsum plaster and plaster of paris packed in convenient size packages. The one pound, five pound and ten pound cartons or packages would no doubt be convenient sizes. Department stores, seedsmen and general store keepers carry agricultural gypsum in eighty pound paper or jute, and 100 pound jute bags. These sizes are acceptable to the large agriculturist, but when housewives want a few pounds of gypsum for their ferns or other household plants, the dealer, in order to accommodate them, has to break into the large size bag. The same is true when the back yard gardener desires to secure a few pounds of agricultural gypsum to mix with calcium arsenate for the control of leaf eating insects. The back yard poultry keeper, desiring to secure a small supply of agricultural gypsum for dropping boards and sanitary purposes around the poultry house has to ask his dealer to break open an 80 pound or 100 pound bag.

How fine it would be if the small user, and there are countless thousands of them, could get his requirements in five, ten, fifteen or twenty pound bags. It has been proved beyond doubt that the good looking package sells merchandise, and merchandise on display sells more readily too. It would be easy to show on shelves or counters the small size gypsum package.

There are almost countless uses for plaster of paris as a household utility. Plaster of paris is used for many things; patching purposes, repairing broken statuary, setting an umbrella handle, filling crevices, setting hearth tile, and so on through a list of 101 uses. There is a demand for gypsum plaster in a convenient size package to repair damaged walls, etc. The five and ten cent stores could dispose of thousands of packages of either agricultural gypsum, plaster of paris and gypsum wall plaster.

Building and Loan Association Started by Organized Labor

Labor has organized its own building and loan association and it is now doing business in Chicago. The purpose of this organization is to build 100 per cent union homes for union men at a lower rate of interest than is usually charged by other building and loan associations.

WHEN TO STRIP OVERBURDEN

IN THE August 4th number of Pit and Quarry appeared a brief article on the above subject calling attention to the fact that the percentage of clay in the bank should be considered when the problem of stripping was considered. The discussion was written entirely from the standpoint of the material in the bank. The remarks were entirely the personal opinion of the author based of course upon experience and observation. Should there be any others who misinterpreted the intent of the article we are glad to say that the finished aggregate should not contain more than 3 per cent light clay for satisfactory service. If the bank contains 8 to 10 per cent of light clay, stripping in all probability will not be necessary as this percentage will be reduced in the washing and screening to less than 3 per cent. If a particular specification limits the percentage of clay to less than 3 per cent or entirely it will, of course, have to be removed and most likely by washing rather than by stripping. Stanton Walker, director of the engineering and research division of the National Sand and Gravel Association wrote a lengthy letter on this subject with the understanding that the figures quoted referred to the finished aggregate. The letter is worthy of your attention here.

"Our attention has been called to your article on 'When to Strip Overburden,' which appears on page 102 of the Auguth 4 issue of Pit and Quarry. In it the statement occurs that:

" '. . . a small percentage of light soil or clay mixed through the sand will not injure it, especially if the sand is to be used for concrete, for any sharp coarse grain sand will make a better grade of concrete when not over 8 to 10 per cent of loam or light clay is mixed with the sand.'

"As this statement is so definitely opposed to the facts and to the general opinion of engineers, the National Sand and Gravel Association feels that it would be negligent in its duties as the representative of the established sand and gravel industry if this statement were allowed to pass unchallenged. Loam in sand for concrete has been definitely proven to be objectionable by numerous tests, the results of which cannot be questioned. Loam almost invariably carries organic matter, such as tannic acid; even minute quantities of such material will greatly reduce the strength of concrete, or entirely destroy its setting properties. One need only make a casual inspection of the writings of modern authorities to learn that the opinions of engineers who have studied concrete are practically unanimous in this respect.

"It will be agreed without question, I believe, that Professor D. A. Abrams of the Research Laboratories of the Portland Cement Association is the foremost authority today on concrete and concrete materials. With reference to surface loam he says the following in his bulletin on the 'Effect of Tannic Acid in Concrete':

" 'The tests and discussions show the importance of avoiding the use of sands containing organic impurities. Surface loam is a common source of organic material. Contrary to the conclusions based on numerous published tests, surface loam always decreases the strength of a properly proportioned concrete due to two different causes:

1. Presence of organic materials.
2. Additional water required to produce a concrete of given plasticity.

" 'A concrete in which the aggregate is too coarse for highest strength may be slightly improved by the addition of loam or other finely divided material. This means simply that the increase in strength due to a better grading of aggregates more than counter-balances the ill effects of the admixture. Care should always be taken to remove the overburden of soil in sand and gravel pits. Washing when on a comprehensive scale is generally effective in removing loam. A superficial examination may not reveal the presence of organic impurities in sands. The colorimetric test is the only safe guide now known.'

"Support of Professor Abram's statements on the effect of loam may be found in any standard text book on concrete written within the past 10 or 12 years. Taylor, Thompson and Smulski say in Volume I of their treatise on Concrete, Plain and Reinforced:

" 'Poor sand is the most common cause of defective concrete. The presence of organic matter, such as vegetable loam, is the most objectionable characteristic, as such matter, even when present in very small quantities, prevents the concrete from hardening satisfactorily. Concrete containing organic matter may remain soft and friable for months and never attain full strength or resistance to abrasion.'

"In the third edition of Mills' 'Material of Construction,' edited by Harrison W. Hayward of the Massachusetts Institute of Technology, the following is stated with reference to organic matter in sand:

" 'If the SILT contains more than 10 per cent of organic matter, the latter contributing as much as ONE-TENTH of 1 per cent of the sand, an appreciable injury results.' . . . . The CAPITALS are ours.

"In the discussion of 'Impurities in Aggregates' in Hool and Johnson's Concrete Engineers Handbook, the following paragraph appears:

" 'A coating of organic matter on sand grains, such as loam, appears not only to prevent cement from adhering but also to affect it chemically. In

some cases a quantity of organic matter so small that it cannot be detected by the eye and only slightly disclosed by chemical tests has prevented the mortar or concrete from reaching any appreciable strength.'

"In an appendix to the report of Committee C-9 of the American Society for Testing Materials, on Concrete and Concrete Aggregates (1919 Proc. Part I) it is stated:

" 'Experimental work carried out in the Structural Materials Research Laboratory, Lewis Institute, Chicago, by Professor Duff A. Abrams, in charge, and Dr. Oscar E. Harder, chemist, has shown that it is the presence of organic impurities of a humus nature that is responsible for the effects observed from using sand of this kind. This humus material usually comes from the overburden of soil found in most sand pits; it may find its way into the sand in other ways.'

"The above are only a few of several statements of this nature which are to be found by a perusal of the literature. It should be stated that some early tests of briquettes made about 1900 to 1906, without proper appreciation of test methods, seemed to indicate some beneficial effects from loam. It is possible that the conclusions which you reached in your article are based on these early results obtained by unskilled investigators who were handicapped by the fact that the science of concrete was yet in its infancy. Many of these same investigators believed, as a result of their tests, that sloppy concrete was always stronger than dry concrete; when the true effect of quantity of mixing water was shown, it was contended for a time that wet mixes, while weak at early ages, soon equaled and even surpassed the dry ones in strength.

"To advance these 'facts' as authoritative in the light of our present knowledge would be as absurd as to support the one time generally accepted belief that the earth is flat, or perhaps more apropos, the old theory that the atom was the ultimate indivisible particle. Clay, devoid of organic matter, while less objectionable than loam, should not be permitted in sand for general concrete use, in quantities even approximating the magnitude of the 8 to 10 per cent, which you mention as permissible quantities. Clay, even though it is free from organic matter, is objectionable in concrete aggregate to be used for any purpose, except possibly in cases where the concrete is placed very dry as in machine made concrete products or in certain mass work.

"In fairly wet mixtures such as are used in building construction, clay is more likely than not to be worked to the surface and form laitance. In bridge piers and simliar structures we have seen disintegration which was evidently attributable to a section of fine material of little or no strength which had risen to the top of a section of concrete. Clay is particularly objectionable in sand used for highway construction, as the fine material is worked to the top ofthe pavement slab and provides a friable wearing surface, and one liable to scale. A study of state highway specifications for sand will show that this is the consensus of opinion of highway engineers. All states, except three, place a limitation on the amount of silt removed by elutriation. The majority of the states permit no more than 3 per cent by weight; only one permitting a higher value than this, allowing as much as 4 per cent. Colorado and Iowa place the limit for silt at 2½ per cent, while Illinois, Indiana, Kentucky, Michigan, Minnesota and Missouri allow no more than 2 per cent. Of the states which place no limitation on silt, one specifies that not more than 3 per cent shall pass the 200 mesh sieve, a practically equivalent requirement; while the remaining two take care of it only by their general statements concerning cleanness.

"It is true that some reliable tests have shown that small amounts of clay, evenly distributed throughout the aggregate, tend to increase the strength of concrete made with certain aggregates. However, the deleterious effects pointed out above, vastly outweigh any beneficial effects which might at times accrue from this source. From my observations of sand and gravel plants it would seem difficult to state a general rule governing the necessity of stripping. Most sand and gravel producers consider it advantageous to strip all over-burden. Whether or not stripping should be carried out seems to be a problem which each producer must settle for himself, based on the quality of his finished product. In any event, the finished product should not contain 8 to 10 per cent of clay, and it is a fallacy to state that it may advantageously contain any appreciable amount of loam."

All Western Road Show Expects Big Attendance

National, state, county and municipal road officials from all parts of the United States and Canada will attend the second All-Western Road Show, to be held here October 7 to 15, inclusive. President Tracy W. Harron of the highway exposition committee, has announced the receipt of several hundred inquiries and hotel reservations from officials and highway experts. In addition to the road officers and commissioners, the Road Show committee expects a tremendous attendance of contractors, engineers and crushed stone and sand and gravel producers, and everybody interested in the construction of highways, streets, bridges, dams, sewers, foundations and general construction projects, irrigation, tunnel and railroad construction, hauling and bus transportation.

The benefits from this show are expected to be far reaching not only to the officials but to the trade.

Clinchfield Products Corporation Changes Hands

The Clinchfield Products Corporation, of New York and Erwin, Tennessee, was purchased recently by Herbert P. Margerum, of Trenton, New Jersey. The Clinchfield Corporation was the first to enter the Southern field for the purpose of preparing North Carolina spar for the market. This organization began operations at Erwin, Tennessee, in 1912 and quickly built up a large substantial trade. From the beginning, they supplied a high-grade uniform product, resulting in increased sales and permanently establishing the superior merits of North Carolina feldspar for all uses requiring this material.

About three years ago, Mr. Margerum decided to enter the feldspar business with several very definite ideas in mind, some of the important ones being:

1. To develop a strong organization.
2. To be in position to render the ceramic industry a genuine service in the way of being able to supply large quantities of well balanced uniform feldspars.
3. To have a sufficient number of mines and mills, the latter located at strategic points to assure the users of feldspar uninterrupted service.

With this in mind, Mr. Margerum purchased the holdings of the Golding Sons' Company and began immediately to put his ideas into operation. The Golding Sons' Company has been supplying dependable ceramic materials for the past sixty years. This company has developed a very substantial business and has provided itself with extensive feldspar mines in Maine, Connecticut, Maryland and North Carolina, with modern grinding mills at Trenton, N. J., East Liverpool, Ohio, and Erwin, Tenn. They also have large clay mines and plants at Hockessin, Delaware, and Butler, Ga.

During the latter part of 1925, a thorough investigation of the holdings of the Erwin Feldspar Company was made by Mr. Margerum, which he later took over and combined with the Golding Sons' Company, thus adding a number of important properties to his holdings. This combination has proven of much value to the users of feldspar inasmuch as it has permitted the establishment of greater facilities for rendering service.

Some weeks ago, Mr. Margerum was approached with a proposal to take over the Clinchfield Products Corporation and to combine their holdings with his other companies, which was done early in July of this year. The original ideas and plans of Mr. Margerum have been successfully carried out. It is his belief that he has provided a service for the ceramic industry that has not heretofore been available. It is the aim and purpose of this combination to supply only dependable products at reasonable prices.

The New York office of the Clinchfield Company, at 350 Madison Avenue, will be maintained for a short period of time and will later be moved to the Trenton Trust building, in Trenton, N. J., the headquarters of the Golding Sons' Company and Erwin Feldspar Company.

Theodore P. Kimman Passes

Theodore P. Kimman, works manager of the Cleveland plant of the Chicago Pneumatic Tool Company, died at his home July 24, 1926, from heart disease.

He was the inventor of the first four-piston air drill and was considered an authority on mechanics. He was associated with Edward N. Hurley, chairman of the shipping board, in the development of air drills. Mr. Kimman was superintendent of the Cleveland plant from 1903 to 1921, when he succeeded his brother, H. J. Kimman, as works manager. During the war the plant was engaged in manufacturing shells for the United States, Great Britain and Russia.

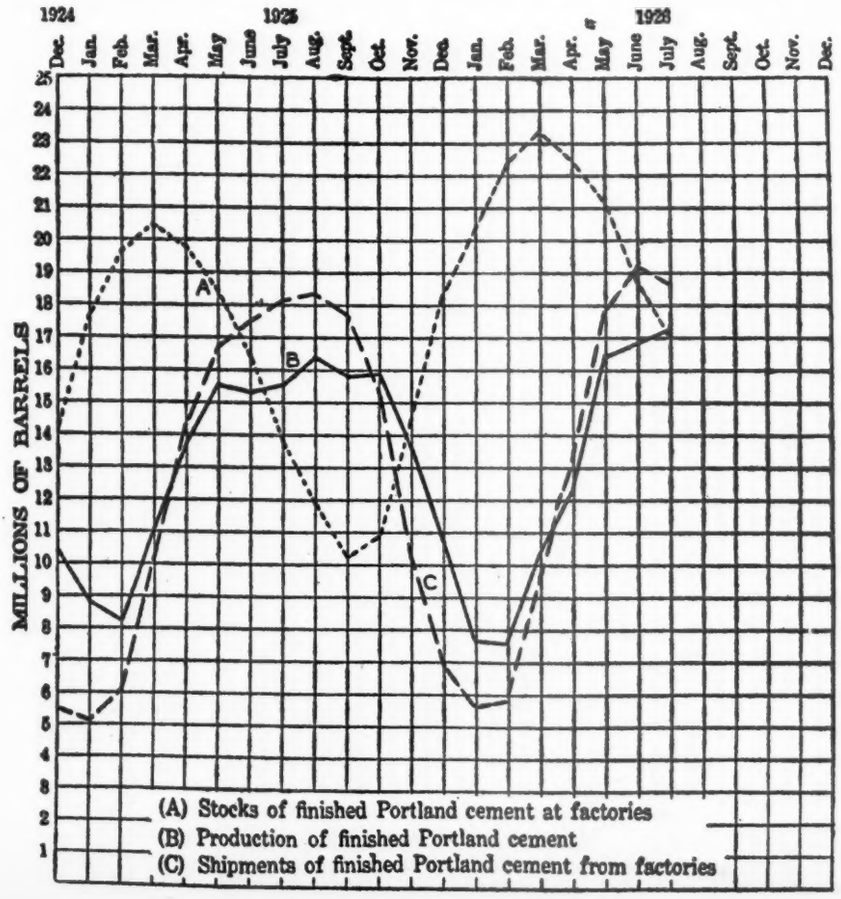
New Foote Representatives

The Indianapolis Belting & Supply Company, 34 S. Capital Street, Indianapolis, Indiana, have recently been appointed as district representatives for the IXL Speed Reducers and Gear Products, manufactured by the Foote Bros. Gear & Machine Company for Indianapolis and the vicinity. The Roberts Tool & Supply Company of Syracuse, New York, have also recently been appointed district representatives for Syracuse and vicinity.

Portland Cement Statistics for July

Production of Portland cement reached a new level in July, while shipments were exceeded only by those of the preceding month and were over 3 per cent greater than the shipments in July, 1925. Portland cement stocks decreased but were still high and at the end of July were more than 23 per cent greater than on July 31, 1925. These statistics, prepared by the Division of Mineral Resources and Statistics of the Bureau of Mines, are compiled from reports for July, 1926, received direct from all manufacturing plants except three, for which estimates were necessary on account of lack of returns.

The production, shipments and stocks of finished portland cement appear on pages 96 and 97. The graph below illustrates these same figures.



Production, shipments, and stocks of finished portland cement, by months, in 1925 and 1926, in barrels

Month	Production		Shipments		Stocks at end of month	
	1925	1926	1925	1926	1925	1926
January	8,856,000	7,887,000	5,162,000	5,672,000	17,656,000	20,582,000
February	8,255,000	7,731,000	6,015,000	5,820,000	19,689,000	22,384,000
March	11,034,000	10,355,000	10,279,000	9,539,000	20,469,000	23,200,000
1st quarter	28,145,000	25,973,000	21,456,000	21,031,000	.....	.....
April	13,807,000	12,401,000	14,394,000	12,961,000	19,877,000	22,640,000
May	15,503,000	16,472,000	16,735,000	17,951,000	18,440,000	21,173,000
June	15,387,000	16,827,000	17,501,000	*19,113,000	16,409,000	*18,900,000
2nd quarter	44,697,000	45,700,000	48,630,000	50,025,000	.....	.....
July	15,641,000	17,121,000	18,131,000	18,767,000	13,896,000	17,254,000
August	16,419,000	.....	18,383,000	.....	11,952,000	.....
September	15,939,000	.....	17,711,000	.....	10,247,000	.....
3rd quarter	47,999,000	.....	54,225,000	.....	.....	.....
October	15,992,000	.....	15,309,000	.....	10,979,000	.....
November	13,656,000	.....	10,187,000	.....	14,534,000	.....
December	10,713,000	.....	6,917,000	.....	18,365,000	.....
4th quarter	40,361,000	.....	32,413,000	.....	.....	.....
	161,202,000	.....	156,724,000	.....	.....	.....

*Revised.

EXPORTS AND IMPORTS

Exports of hydraulic cement by countries, in June, 1926

Exported to—	Barrel	Value
Canada	2,666	$ 10,560
Central America	1,537	4,914
Cuba	9,976	23,868
Other West Indies	4,624	10,473
Mexico	16,600	52,678
South America	39,995	121,552
Other countries	5,286	24,769
	80,684	$248,814

Imports of hydraulic cement by countries, and by districts, in June, 1926

Imported from—	District into which imported—	Barrels	Value
Belgium	Florida	5,051	$ 10,255
	Los Angeles	4,629	6,354
	Maine and New Hampshire	6,308	12,990
	Massachusetts	84,203	132,874
	Mobile	10,974	16,734
	New Orleans	29,799	41,720
	New York	185	824
	Oregon	5,832	7,901
	Philadelphia	41,839	67,139
	Porto Rico	8,620	18,675
	San Francisco	7,602	9,694
	South Carolina	3,003	4,506
	Washington	27,167	44,451
	Total	235,212	$374,117
Canada	Florida	57,722	54,285
	Maine and New Hampshire	71	273
	Total	57,793	$ 54,558
Denmark and Faroe Islands	Massachusetts	22,085	30,979
Finland	Rochester	1,197	2,309
France	Massachusetts	2,472	2,525
	New Orleans	953	1,893
	New York	614	734
	San Francisco	596	1,680
	Total	4,635	6,832
Germany	New Orleans	2,621	2,467
Japan	Hawaii	9,496	18,512
United Kingdom	Massachusetts	1,281	3,244
	New Orleans	208	472
	New York	1,042	2,254
	Total	2,531	$ 5,970
	Grand Total	335,570	$495,744

Exports and imports of hydraulic cement, by months, in 1925 and 1926

Month	Exports				Imports			
	1925		1926		1925		1926	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	71,596	$207,547	72,939	$216,431	231,258	$364,196	360,580	$576,717
February	56,249	181,356	73,975	220,706	119,077	206,308	314,118	527,948
March	65,248	200,410	69,080	205,647	218,048	337,039	493,241	812,968
April	89,508	263,831	96,296	284,772	197,686	280,826	257,302	398,114
May	85,385	250,845	78,601	224,365	186,897	286,959	223,130	337,031
June	71,343	217,899	80,684	248,814	254,937	409,539	335,570	495,744
July	98,141	286,543	.....	.....	335,118	449,602	.....	.....
August	103,961	289,904	.....	.....	379,847	611,551	.....	.....
September	102,649	285,225	.....	.....	513,252	789,121	.....	.....
October	73,369	228,467	.....	.....	535,050	824,268	.....	.....
November	101,825	294,201	.....	.....	388,604	678,518	.....	.....
December	100,328	296,900	.....	.....	295,543	526,001	.....	.....
	1,019,597	$3,003,128	.....	.....	3,655,317	$5,813,928	.....	.....

Unique Silver Anniversary

On the evening of July 31, 1926, at the Aurora Country Club, Aurora, Illinois, the Stephens Adamson Manufacturing Company celebrated at a unique anniversary dinner the twenty-fifth year of activity in the production of labor-saving material-handling machinery. In attendance were not only the executives from the two plants—the home plant at Aurora, Illinois, and the branch plant at Los Angeles, California—but also district managers and sales engineers from Boston, New York, Huntington, Pittsburgh, Detroit, St. Louis, Chicago, and Los Angeles.

The novel banquet table arrangement was entirely appropriate to the occasion as the banquet board was equipped with a complete S-A belt conveyor. The conveyor extended down through the center of the table for its entire length of sixty-seven feet. The belt was eighteen inches wide, carried on ball bearing carriers, and operated at a speed of approximately thirty feet per minute, and was reversible. The conveyor operated with marked smoothness and to such an extent that a glass of water could be transported from one end to the other without spilling.

The various courses of the dinner were served on the belt conveyor, being placed on the slow-moving belt in the serving pantry adjacent to the dining hall. As the courses progressed they were taken from the belt by the guests, who found cards bearing their names neatly attached to each plate. At the termination of each course the conveyor was reversed, and the belt carried the dishes back to the kitchen.

It was unusual and appreciated that this dinner was elaborately prepared and served without the presence of waiters or waitresses in the dining hall. While this sort of an equipment might never become a commercial possibility, there were those in attendance who expressed the thought that such a labor saving device would not be beyond the realm of practicability.

Kuhlman Appoints

The Kuhlman Electric Company, manufacturers of Kuhlman power, distribution and street lighting transformers, announces the appointment of Mr. H. F. Darby, Jr., 1700 Walnut street, Philadelphia, Pennsylvania, as direct factory representative in the Philadelphia district. For more than twenty years, Mr. Darby was with the Cutter Electrical and Manufacturing Company, and during the last six years he was sales manager of that organization.

DISTRIBUTION OF CEMENT

Portland cement shipped from mills into states in May and June, 1925 and 1926, in barrels*

Shipped to—	May		June	
	1925	1926	1925	1926
Alabama	185,314	184,774	214,195	215,892
Alaska	0	2,296	1,284	1,130
Arizona	32,749	37,717	32,451	46,262
Arkansas	87,340	64,713	92,101	66,835
California	1,081,945	1,165,540	1,066,088	1,187,724
Colorado	125,744	119,761	120,818	124,451
Connecticut	177,292	209,515	172,564	206,301
Delaware	28,892	38,972	37,330	45,642
District of Columbia	103,996	85,961	81,334	86,218
Florida	313,846	386,712	348,330	297,204
Georgia	127,545	186,398	129,748	174,488
Hawaii	5,608	13,705	6,108	14,360
Idaho	28,613	58,044	28,122	54,424
Illinois	1,790,601	1,671,317	1,636,329	1,854,806
Indiana	569,436	548,639	617,360	635,118
Iowa	346,484	317,323	310,558	329,422
Kansas	242,880	259,208	233,522	247,335
Kentucky	195,351	185,751	231,491	176,187
Louisiana	99,402	96,519	100,016	106,338
Maine	38,435	51,441	43,541	66,264
Maryland	231,935	279,126	249,105	244,763
Massachusetts	374,243	362,878	350,620	338,079
Michigan	1,140,027	1,206,893	1,264,462	1,469,758
Minnesota	425,473	496,800	409,235	526,695
Mississippi	47,573	73,146	66,012	73,345
Missouri	652,330	696,773	583,561	631,184
Montana	28,170	23,832	28,904	23,114
Nebraska	198,333	190,275	181,516	187,780
Nevada	11,676	8,165	10,784	9,895
New Hampshire	36,814	46,559	40,337	48,285
New Jersey	721,605	770,730	737,572	773,450
New Mexico	17,141	12,004	18,406	16,222
New York	2,028,808	2,223,644	2,090,644	2,475,868
North Carolina	289,056	424,474	324,201	420,248
North Dakota	47,789	58,351	66,089	75,470
Ohio	1,054,230	1,186,056	1,099,767	1,310,691
Oklahoma	235,096	229,209	225,879	219,946
Oregon	129,048	127,318	134,038	150,962
Pennsylvania	1,482,560	1,613,851	1,869,299	1,697,387
Porto Rico	0	0	0	0
Rhode Island	72,914	96,407	89,213	80,912
South Carolina	74,198	58,544	85,087	47,279
South Dakota	66,445	61,899	59,120	53,091
Tennessee	163,812	201,130	185,536	206,917
Texas	373,605	431,778	411,795	447,231
Utah	41,447	31,753	37,733	66,883
Vermont	24,178	28,202	26,978	32,291
Virginia	154,167	196,368	172,760	211,665
Washington	265,735	212,259	328,589	260,756
West Virginia	140,992	217,387	161,484	208,308
Wisconsin	507,654	537,441	569,687	691,934
Wyoming	32,466	17,558	31,290	20,331
Unspecified	8,023	69,750	3,996	81,004
	16,659,016	17,874,866	17,417,489	19,038,145
Foreign countries	75,984	76,134	83,511	74,855
Total shipped from cement plants	16,735,000	17,951,000	17,501,000	†19,113,000

* Includes estimated distribution of shipments from three plants in May and June, 1926, and from four plants in May and June, 1925. † Revised.

Production, shipments, and stocks of finished Portland cement, by districts in July, 1925 and 1926, and Stocks in June, 1926, in barrels

Commercial District	Production July		Shipments July		Stocks at end of July		Stocks at end of June
	1925	1926	1925	1926	1925	1926	1926*
East. Pa., N. J., & Md.	3,703,000	3,935,000	4,564,000	4,215,000	2,460,000	3,687,000	3,967,000
New York	838,000	911,000	1,045,000	1,146,000	757,000	992,000	1,227,000
Ohio, West. Pa., & W. Va.	1,618,000	1,797,000	1,754,000	2,006,000	1,612,000	2,017,000	2,226,000
Mich.	1,223,000	1,506,000	1,322,000	1,681,000	967,000	1,558,000	1,734,000
Wis., Ill., Ind., & Ky.	2,249,000	2,453,000	2,743,000	3,018,000	2,611,000	2,400,000	2,964,000
Va., Tenn., Ala., & Ga.	1,230,000	1,445,000	1,375,000	1,420,000	264,000	1,150,000	1,125,000
Eastern Mo., Ia., Minn. & S. Dak.	1,444,000	1,602,000	1,846,000	1,756,000	2,399,000	2,263,000	2,417,000
West. Mo., Neb., Kans. & Okla.	1,110,000	1,067,000	1,187,000	1,160,000	1,529,000	1,361,000	1,454,000
Texas	454,000	459,000	463,000	464,000	232,000	472,000	478,000
Calif.	1,122,000	1,302,000	1,139,000	1,276,000	435,000	528,000	502,000
Colo. & Utah	246,000	644,000	208,000	625,000	382,000	826,000	806,000
Ore., Wash., & Mont.	404,000		485,000		243,000		
	15,641,000	17,121,000	18,131,000	18,767,000	13,896,000	17,254,000	18,900,000

* Revised.

Estimated clinker (unground cement) at the mills at end of each month, 1925 and 1926, in barrels

Month	1925	1926	Month	1925	1926
January	7,017,000	9,074,000	July	6,961,000	8,490,000
February	8,497,000	10,931,000	August	5,640,000	.....
March	9,962,000	12,284,000	September	4,561,000	.....
April	9,731,000	12,934,000	October	4,086,000	.....
May	9,053,000	11,649,000	November	5,013,000	.....
June	7,937,000	*10,086,000	December	6,469,000	.....

* Revised.

New Chains and Sprockets Catalog Issued

The Webster Manufacturing Company has recently issued catalog number 46, describing the chains and sprockets manufactured by them. The various chain types are illustrated and best service noted for which they may be used. The types are: Detachable, sawmill pintle, special pintle, closed end pintle, ley bushed, combination, malleable roller, riveted drag or sawdust, detachable drag or sawdust, steel refuse, bevel top transfer, steel bushed roller, steel bar bushed roller, ice and car haul. Different attachment links designed to be used with the detachable type of chains are illustrated. Tables of these attachment links giving catalog number or letter and chain numbers for which the attachment was designed are included.

Line drawings and tables are given of the various types of chains showing dimensions of overall width, inside width, pitch, height and average ultimate strength in pounds. These dimensions are useful to the engineer designing machines or devices requiring chains. The types of sprocket wheels made by this company and illustrated in the catalog are: Solid, split, plain center, refuse chain, long pitch chain and special double tooth. The sprocket wheels are made of high grade cast iron with regular or chilled rims. Chilled rim sprocket wheels have smooth hard rim surfaces with deep chills which make them especially well adapted for severe service where sand, gravel, stone, cement or other abrasive materials are present. The chilled rim wheels also hold the proper pitch diameter for a greater length of time, thus increasing the life of the chain. Tables are included of the various sprocket wheels giving pitch diameter in inches, number of teeth, largest bore at regular price and cost per unit.

Tables and illustration of traction wheels are given. These are used in place of sprocket wheels on elevators handling heavy or gritty materials. The wheels are made with smooth rims and the friction between the wheel and the chain furnishes ample traction although the chain is allowed to slip when the elevator becomes clogged or otherwise obstructed. Elevators provided with traction wheels and handling heavy or gritty material will run more smoothly and last longer than if sprocket wheels were used.

Illustrations giving important dimensions with tables of elevator arms for either vertical or inclined elevators, pocket wheels, operating chain and chain tighteners are also included in this book. The catalog is well prepared and comprises a fund of information valuable to designers.

Doubles Plant Capacity After One Season

Increased demand during the winter months caused the Rock Island Sand Company of Manhattan, Kansas, to double its output and purchase new equipment after only a brief season of dredging. In 1924 B. K. Walter and H. E. Hayward, of Manhattan, decided to start a sand operation to meet the steadily increasing demand for material for concrete aggregate, asphalt filler and mason's sand. They purchased a 6 inch Amsco pump which was duly installed on a barge and put to work in the Kansas river three miles east of the city.

Operation was not started until October 10th and it closed down for the season two months later to the day. During that time they operated at a capacity of 300 tons a day producing all the way from very fine asphalt sand to coarse gravel to be used in concrete aggregate without crushed stone.

When the operation was shut down for the season the pump was moved to the Odd Fellows State Home for Aged and Children where the partners, now known as the Rock Island Sand Company, had a contract to dredge the bottom of the old Eureka lake and deposit the mud on the grounds of the home. This meant the movement of 15,000 cubic yards of mud, and try as they would the job could not be completed when the Kansas river was again ready to yield up its sandy bottom.

The spring trade was calling and the firm answered by purchasing an 8 inch Amsco pump for the barge. The 50 h.p. General Electric motor used to run the pump was replaced by another General Electric motor of double the capacity. The 3 h.p. motor to raise the suction gave place to a 5 h.p. General Electric. The new machinery responded by doubling the capacity, which is now 600 tons for a ten hour day.

The barge is 36 feet long by 18 feet wide and 3 feet deep. The discharge line is carried to the shore by pontoons 14 feet long by 6 feet wide by 2 feet deep. The line is 300 feet long and rises to a height of 47 feet above the water level.

Arriving at the screening plant on shore the discharge line empties into a bin which is six feet square. This furnishes good agitation and wash. Oversize is kept from the bin by a grizzly of half inch rods placed an inch and a half apart directly under the discharge mouth. The grizzly which is inclined shunts the material away from the bin to the ground. This is wasted as there is no crusher in the present installation.

At present a flat screen 7 feet long by 3 feet wide with a pitch of 2 feet is used for separating the material, but it is planned to change the screening arrangement and storage bins in the near future. From the screen the material goes to storage bins which discharge directly into cars or to open storage. A spur from the Chicago, Rock Island and Pacific Railroad runs by the bins. There are also good shipping facilities via the Union Pacific Railroad. The company specializes in four grades of sand: coarse for concrete without crushed stone; river run for all around work; screened for mason work and fine screened for railroad engines and asphalt.

Moffit Operates Two Dredges

Seldom is a sand and gravel operator so satisfied with the layout of his plant and the efficiency of his machinery that he builds a second which is a duplicate of the first, but this has been done by the Moffitt Sand and Gravel Company of Lincoln, Nebraska. This company operates two dredging plants in the slow flowing Platte river. The stream, renowned for its laziness, did enough work in past ages to lay down at Ashland and at Morse Bluff, Nebraska, sand and gravel deposits which meet all the requirements of road builders, aggregate makers, and building constructors of today. The Chicago, Burlington and Quincy Railroad aids in getting the product to market at Ashland and the Chicago and Northwestern is available at Morse Bluff.

The dredges in both cases are built of pontoons 18 feet long, 5 feet wide and 3 feet deep. Six of these are placed side by side and bolted together at both top and bottom by two 8x8 feet timbers. A floor is then laid over the entire structure. This gives a barge 18x30 feet but it can be enlarged at any time there is need. The procedure is simple and economical. The material is sucked from the bottom of the river and pumped into an 8 inch discharge pipe which is carried to the shore by pontoons. As the material is thoroughly agitated in passing through the pump and discharge line, all dirt is removed, passing off with the overflow. An 8 inch Morris and an 8 inch Amsco pump are used for this work. The pumps are belt driven by a six cylinder Twin City 110 h.p. gasoline engine. Still another pump, a 2 inch Amsco centrifugal, is used on each barge to furnish cooling water for the engine and priming injector of the large dredging pump. The suction pipe is raised and lowered by power taken from the gasoline engine from an 8 inch pulley to a jack shaft.

On shore the discharge delivers to a gravity screening structure which is 35 feet high. The screens continue the agitation of the washing process, separating the sand and gravel and rejecting the oversize. This is not of sufficient quantity to be any problem and is wasted without crushing. The gravel goes to one bin and the sand is chuted to another. They are so located that it is possible to load two cars, one of each material, at the same time. Cars are spotted by means of a double drum gasoline hoist. When the bins are filled, open storage is resorted to. Dry sand and gravel are loaded to cars during freezing weather by a Barber Greene belt conveyor. This is operated by a four cylinder Buda engine.

A Combination Air Compressor and Arc Welder

A combination air compressor and arc welder driven by a gas engine and mounted on a single base has been placed on the market by Schramm, Inc., of West Chester, Pennsylvania. The outfit consists of a Buda gasoline engine, a Schramm compressor and a General Electric welding outfit. The complete equipment may be mounted on a standard two-ton truck or can be made portable by adding steel or rubber-tired wheels.

The Buda engine is a 24-h.p., 800 r.p.m. unit which may be started and operated independently of either the compressor or welding generator. The Schramm compressor is a two-cylinder, water-cooled machine with a capacity of 120 cubic feet per minute and equipped with an automatic unloading device. The air receiver is 16 inches in diameter by 42 inches high. The General Electric welding equipment consists of a belt-driven WD-12 arc welder with an idler pulley for belt tightening. By the use of a Borg & Beck 12-inch clutch coupling, either of the machines may be connected to the engine.

This combination outfiit is expected to be of great value in field work. The air compressor can be used to operate drills, grinders and chipping hammers for cutting, peening, caulking and cleaning off scale. The compressor can also be used in preparing work for welding. With the G-E WD-12 welder light and heavy gauge steel can be welded as well as cast iron. After the welding is completed, the compressor clutch is thrown and the weld can be ground or chipped as desired. Thus a complete job can be done with the single machine. The structural steel base is 8 feet 4 inches long, 5 feet 11 inches wide. The outfit is 3 feet 10 inches high. The total net weight of the outfit is 4,000 pounds.

General Electric Motors

The General Electric Company has recently developed two new types of motors. Direct-Current Crane and Hoist Motors, Type CO—1820 are illustrated and described in Bulletin G E A-38 which supersedes 68100-C. This type of motor has been produced as a result of years of accumulated experience by this company in building motors for crane, hoist and similar work. They are built compact, yet liberally designed, being especially adaptable to heavy reversing duty and the particularly severe operating conditions to which motors for this service are usually subjected. Among their special features are extra heavy shafts and generous bearings, cast steel frames split horizontally, large poles, interpoles, dirt and moisture resisting high grade insulation. These motors are built in sizes from 3 to 165 h.p. and for voltages of 115, 230 and 550.

G E A-71 A describes the Wound Rotor Induction Motors—"900" Series made in 2 types, M T being 3-phase and M Q—2 phase, both types being for constant and adjustable varying speeds. The motors are general purpose inductor motors adapted for heavy duty starting. They may be used for either constant or adjustable varying speed work, depending on the type of control used. They are applicable for use on polyphase circuits where frequent and heavy starting service is involved or when low starting current is imperative. These motors are made in sizes from ¾ to 10 h.p. with 220, 440 or 550 volts and can be furnished for 50, 40 or 25 cycle operation.

1925 Barium Products Sales Show Marked Increase

Sales of barium products, reported by domestic producers in 1925, amounted to 213,347 short tons, valued at $17,434,378—an increase of 29 per cent in quantity and 20 per cent in value as compared with sales in 1924. Nearly 90 per cent of the ground barytes sold was manufactured in Missouri. Seven lithopone plants in the Middle Atlantic states and four plants in Illinois were operated during the year. Figures on barium chemicals include only those made directly from barytes or from primary salts of barium produced in the same plant.

Barium Products Made in the United States from Domestic and Imported Crude Ores and Sold in 1924 and 1925

	1924		1925	
	Short tons	Value	Short tons	Value
Ground barytes	38,296	$ 784,881	49,674	$ 1,040,461
Lithopone	109,469	12,531,397	145,019	15,186,147
Barium chemicals:				
Carbonate	6,058	411,332	4,962	279,346
Chloride	3,859	297,182	13,692	928,424
Sulphate (blanc fixe)	7,796	464,152		
Other*	441	41,234		

* 1924: Hydroxide and sulphide; 1925: Chloride, hydroxide, sulphate and sulphide.

F. B. Ungar Transferred

Mr. Frank B. Ungar, for many years Chicago representative for the Ludlow-Saylor Wire Company, manufacturers of wire cloth and woven wire screens, has been transferred to the general offices of that company in St. Louis and appointed assistant to the general manager of sales. Mr. Ungar has been connected with the sales department of The Ludlow-Saylor Wire Company for twenty-six years, and is known to industrial buyers and operating men throughout the country.

Frank B. Ungar

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,592,949. Machine-leveling means. Erick H. Lichtenberg, Milwaukee, Wis., assignor to Koehring Co., same place.

1,592,985. Reenforcement of concrete structures. Philip H. Markmann, St. Louis, Mo.

1,593,010. Mining apparatus. William E. Boudette, Claremont, N. H., assignor to Sullivan Machinery Co., same place.

1,593,037. Paving-mixer construction. Adolph W. Rybeck, Milwaukee, and Frederic E. Bager, Sr., South Milwaukee, Wis., assignors to T. L. Smith Co., Milwaukee, Wis.

1,593,261. Boom. Grant Holmes, Danville, Ill., assignor to Marion Steam Shovel Co., Marion, Ohio.

1,593,271. Finishing appliance for concrete pavements. Frank L. Shidler and Robert D. Gregg, Kankakee, Ill.

1,594,178. Cement and process of making same. Hans Kuhl, Berlin-Lichterfelde, Germany, assignor to Albert T. Otto & Sons, New York, N. Y.

1,594,508. Excavating-dipper with integral bail-ears. Claude Rorabeck, Chicago Heights, Ill., assignor to American Manganese Steel Co., Chicago, Ill.

1,594,551. Mining-machine. Charles B. Officer, Winnetka, Ill., assignor to Sullivan Machinery Co., Claremont, N. H.

1,594,566. Tripping mechanism for scoops. Guy B. Scott, Painesville, Ohio.

1,594,854. Shaking screen. Philip S. Savage, Buffalo, N. Y., assignor to Robins Conveying Belt Co.

1,594,919. Control mechanism. Edwin J. Armstrong, Erie, Pa., assignor to Erie Steam Shovel Co., same place.

1,594,990. Balanced ball mill. William M. Barker, Canton, Ohio.

1,595,494. Apparatus for manufacturing concrete blocks and the like. Jesse M. Barnett, Wilkinsburg, Pa.

1,595,568. Grab. Almon E. Norris, Brookline, Mass.

1,595,685. Screen. Terencio Parini, Canada Rosquin, Argentina.

1,595,721. Chain and bucket excavator. William P. Hughes, Alameda, Cal.

1,591,703. Rod-mill. Roy C. Greenfield, Milwaukee, Wis., assignor to Allis-Chalmers Mfg. Co., same place.

1,591,941. Comminuting-mill. Ray C. Newhouse, Wauwatosa, Wis., assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis.

1,591,942. Crusher. Ray C. Newhouse, Wauwatosa, Wis., assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis.

1,591,948. Concrete building system for dwellings. James F. Adams, Washington, D. C.

1,591,959. Screen. John Bland, Chicago, Ill.

1,591,968. Expansion-joint for concrete roads. Albert C. Fischer, Chicago, Ill.

1,592,135. Roller-mill. Walter M. Cook, Ludlow, Vt., assignor to Raymong Bros. Impact Pulverizer Co.

1,592,312. Crushing-head. Edgar B. Symons, Barkersfield, Cal., assignor to Symons Bros. Co., Milwaukee, Wis.

1,592,813. Gyratory cone crusher. Edgar B. Symons, Bakersfield, Cal., assignor to Symons Bros. Co., Milwaukee, Wis.

Small Power Transformers

The General Electric Company has recently issued Bulletin G E A-424, superseding Bulletin number 45110 D, describing the distribution and small power transformers which they manufacture. This company maintains one of the best departments for testing electrical equipment in the world, and each transformer which they manufacture receives a thorough commercial test before shipment. One piece of testing apparatus in one of their plants will produce a lightning discharge having a potential of 2,000,000 volts above ground. The wave form of this discharge is under complete control, and the wave front may be made to increase at the rate of 50 million volts per second. This equipment is of such capacity that it is possible to produce an arc in which the rate of energy dissipation is in the order of millions of kilowatts. It is thus possible to study the characteristics of transformers and other apparatus under conditions actually met in practice.

For convenience, transformers 500 K.V.A. and smaller are divided into two groups; those up to 200 K.V.A. being arbitrarily known as distributing transformers, while those from 201 to 500 K.V.A. are called small power transformers. Single-phase transformers are designated as type H and three phase transformers as type H T.

For a number of years the National Electric Light Association has advocated the standardization of transformer voltages and sizes and the reduction of the almost unlimited combinations and variations which were previously considered necessary. The transformers built by this company follow the standards required by this association. Several forms of construction are used in the distribution units and the small power transformers, which have been selected after a scientific study of the requirements for a balanced design best adapted to the particular class of service for which it is built.

Irrespective of the forms of construction used, all transformers are designed to give maximum efficiency for average operating conditions and cost of power; namely, exciting and load losses are so balanced that transformers usually connected to the line 24 hours a day, with intermittent load, will have comparatively low excitation losses, while in other ratings, where the load is usually more uniformly distributed over a period when the transformer is excited, a higher percentage of core loss, with corresponding reduction of the load loss, will give a higher all-day efficiency.

The bulletin analyzes the several details used in manufacturing the transformers stating their construction and material from which each is made. The design of each element is discussed with its distinct functions. Line drawings are given showing the outside dimensions of the various sizes of transformers thus enabling purchasers to know what space is necessary for the installation of this equipment. Four large power transformer installations illustrated by means of half tones are interesting in showing where these transformers are being applied and used successfully.

New Brown Hoist Official

Mr. H. G. Steinbrenner has been elected Second Vice-President of The Brown Hoisting Machinery Company of Cleveland and will have charge of the marketing of the company's products.

Mica Production in 1925

The total quantity of uncut mica sold by producers in the United States in 1925, as reported by the Bureau of Mines, Department of Commerce, was 10,592 short tons, valued at $459,499. Of this quantity 897 tons (1,793,865 pounds), valued at $321,962 was sheet mica; the rest was scrap mica. The production was made by twelve states, North Carolina, New Hampshire, South Dakota, New Mexico, Virginia, South Carolina, Georgia, Connecticut, Colorado, Alabama, Maine, and Nevada, named in order of total quantity from greatest to least.

The total sales of uncut sheet mica in 1925 showed an increase of 23 per cent in quantity and 52 per cent in value, as compared with 1924. The total quantity of scrap mica sold was more than that of 1924, and the value was nearly twice as much. The average value per pound of sheet mica sold in the United States in 1925 was about 18 cents, and the average value of scrap mica a short ton was about $18. The imports of mica for consumption were 4,901,308 pounds, valued at $1,798,827. Corresponding figures for 1924 were 5,801,151 pounds, valued at $2,326,906.

New Incorporations

Quality Buildings Supply Co., New York City. Capital, $10,000. Incorporators: D. and E. Scognomiglio, A. M. Greico. (Filed by A. M. Chamow, 51 Chambers St., Manhattan, N. Y.)

The Allied Concrete Products & Supply Co., Perth Amboy, N. J. Capital, $100,000; manufacture concrete products. Incorporators: Steve W. Bonk, Marie Keak, Huyler E. Homond, Perth Amboy, N. J. (Atty.. P. J. Quackenbush, Perth Amboy, N. J.)

Macon Crushed Granite Company, Wilmington, Delaware. Capital, $165,000. (Preparing for market granite, stone.) Incorporator: A. L. Miller, Wilmington, Delaware.

Superior Portland Cement Company, Seattle, Washington. Capital, $30,000,000. Decree of dissolution.

Rio Grande Cement Plaster Company, San Antonio, Texas. Capital, 500,000 shares, non-par value. Incorporators: Lee Dekle, J. L. Brown and J. W. Moon.

United States Gypsum Company, Illinois. Capital increased from $288,284.63 to $320,643.11.

Dakota Sand and Gravel Company, Washburn, N. D. Capital $12,000. Herman A. Brocopp, Bertha Brocopp and M. D. Avery, Bismarck, N. D., incorporators.

Monesson Sand and Gravel Company, Monesson, Penn. Capital $25,000. J. J. Kilroy, incorporator.

Stelton Lumber and Manufacturing Co., New Brunswick, N. J. (building materials). Capital $125,000. Incorporators: Herbert S. Wood, Ella J. Wood, Herbert C. Wood, all of Stelton; Herbert G. Wood, Piscataway, N. J. (Atty. Warren R. Schleck, 41 Paterson St., New Brunswick, N. J.)

Star Maconic Association, Tuckahoe, N. Y., deal in building materials. Capital $50,000. Incorporators: Randolph Marshall, Tuckahoe; Elmer S. Steelman, Petersburg, N. Y.; Stanley Y. Gandy, Lynwood, N. Y. (Atty. Andrew C. Boswell, Ocean City, N. J.)

United Sand and Gravel Corporation, Trenton, N. J. Capital: 750 shares, no par value. Incorporators: Mandel H. Hausman, 837 So. 10th St., Israel Hausman, Newark, N. J., Florence V. Sigler, 540 Edgewood Ave., Trenton, N. J., Maxwell A. Kraemer, Trenton, N. J., atty.

Domestic Uncut Mica Sold by Producers in the United States in 1924 and 1925

	Sheet mica		Scrap mica	
	Pounds	Value	Short tons	Value
North Carolina:				
1924	597,385	$108,656	3,212	$ 59,620
1925	592,478	105,376	5,095	74,818
New Hampshire:				
1924	744,133	88,737	492	9,498
1925	1,120,857	198,858	1,953	47,525
Other States:*				
1924	119,379	14,642	1,005	18,124
1925	80,530	17,728	2,647	51,194
Total: 1924	1,460,897	$212,035	4,709	$ 87,242
1925	1,793,865	321,962	9,695	173,537

* 1924: Alabama, Colorado, Connecticut, Georgia, New Mexico, South Carolina, South Dakota, and Virginia; 1925: Alabama, Colorado, Connecticut, Georgia, Maine, Nevada, New Mexico, South Carolina, South Dakota, and Virginia.

CRUSHING DETAILS AT THE PIONEER SILICA PLANT

The Pioneer Silica Products Company operates an underground silica products plant at Pacific, Missouri, which was described in the August fourth number of Pit and Quarry. The deposit formation is very massive and shows but little trace of bedding. The sand grains are especially well rounded. Because the deposit is a steep cliff-like outcrop and the exposed surfaces are subject to weathering, underground methods are employed to protect the purity of the product. A tunnel was opened directly into the side of the cliff. This tunnel is widened as it progresses from the entrance, and rooms or pockets are worked off the main tunnel. The broken material is loaded by hand shovels into mine cars which are hauled by a winch to the crusher tipple and discharged into a number one Williams "Jumbo Junior" crusher.

In the previous article we overlooked the fact that the crusher was a number one Williams "Jumbo Junior" operated by a 25 h. p. motor. This crusher takes one and two man stone as shot down and reduces it to 85 per cent natural grain in one operation at the rate of 20 tons per hour. This crusher, which is a combined crusher and pulverizer, feeds the entire plant. The large ratio of reduction of this unit enables the Pioneer Silica Products Company to handle hand loaded rock and reduce to 85 per cent natural grain size in one operation.

In the Williams "Jumbo Junior" crusher each hammer strikes a two ton blow. Each hammer weighs 24 pounds. The heavy breaker plate bears the brunt of the crushing. This plate is a heavy block 3 inches thick of extremely durable material, held in place by a lug and wedge arrangement making it very easy to renew when worn. As the ends of the hammer or the breaker plate wear, the breaker plate can be moved closer to the hammers to overcome this wear and preserve the original adjustment. This is accomplished by the patented adjustable front end which is pivoted at the top allowing the lower end to be raised by means of two adjusting screws. Raising or lowering of the breaker plate also assists the operator in regulating the size of the crushed material.

The Harnischfeger Corporation announces that Mr. E. Lynn Puckett of Richmond, Virginia, has been appointed district manager of Charlotte office, located at 1118 Independence Trust Building.

A New Product

There was recently organized at Marion, Ohio, The General Excavator Company, which company purchased the land, buildings and equipment which were formerly the property of the Fairbanks Steam Shovel Company. This new company is now rehabilitating, rebuilding and re-equipping this property. The plant is strategically located, being served by the Pennsylvania, Big Four, Hocking Valley, Erie, C. D. & M., and C. M. & B. railroads. Since the founding of the original Fairbanks Company more than 25 years ago, this plant has been exclusively devoted to the manufacture of excavating machinery. The new company, which is composed of Marion men will soon announce a new one-half yard combination shovel, drag-line, crane, back-trencher and level street grader to be either gasoline or electric powered. It will be mounted on continuous treads and the whole ensemble will be different from anything ever offered in this field. The personnel of the organization includes some of the best known men in the excavating machinery industry, whose experience in this line should be a large factor in the success of the new company.

The Mill of the Pioneer Silica Products Company

A Large Gyratory Crusher

The Traylor Engineering Company recently designed and manufactured a gyratory crusher for one of the large mining companies in the middle west which is worth noting. The striking feature is its size, the crusher being shown in the half tone. This machine is a 48 inch gyratory crusher with a capacity of approximately 2,000 tons of rock per hour with ring size of opening set at 9 inches or 1,200 tons per hour when the ring is set with a 6 inch opening.

The crusher is about 25 feet high and occupies a floor space, including the drive shaft, of 14x30 feet and is driven by a 350 h.p. motor. This gyratory crusher is one of the largest ever built in this country and its total weight is approximately 525,000 pounds.

A Comparison of the Standard with the Large Crusher

To get some idea of the size of this crusher by contrast, referring to the half tone, at the left is shown an 8 inch crusher. This machine is 5 feet 11 inches high to the top of the spider from the base. On the base of this smaller crusher has been placed the eye bolt to be used in the large crusher and adds to the striking illustration of contrast between these two crushers. After this large crusher had been assembled it was given a continuous test for 24 hours in the plant before being dismantled and shipped. It can readily be realized that the shipment of such a large unit is quite a problem. This machine required 10 cars to remove it from the makers to its destination. Some interesting details of the shipment are: The head and shaft weighing 46 tons required a car; the spider needed another car; a car was used to convey each half of the shell. Weights of some of the details are: eccentric, 10,000 pounds, eccentric bushing 4,000 pounds, and the drive shaft weighs approximately 25 tons. These figures will convey to the reader some idea of the enormous size of this crusher which will be further emphasized by the illustration.

New General Electric Battery Chargers

As a result of modifications of design, the General Electric Company is now marketing a complete new line of battery charging equipments in uniform frame sizes. These equipments consist of motor generators and unit control sections. They are particularly applicable to the multiple charging of batteries used in electric industrial trucks, electric road trucks and storage battery locomotives.

The motor generators are designed to operate at speeds running from 1800 r.p.m., for the sizes up to 35 kilowatts, to 1200 r.p.m. on larger sizes. Stocks will be carried of outfits for such special voltages as 32, 45 and 55, together with the standard 115-volt type. The generators are flat compounded between no load and three-quarter load, and have slightly drooping characteristics beyond the three-quarter load point. The rise in voltage between these two load points is comparatively small. Unit control sections for these motor generators will be furnished either as part of the complete charging equipment or separately. An important feature of the design is compactness, making it possible to control a large number of circuits in a limited space.

The general line consists of two-circuit sections designed for manual control of the charging rate and the terminating of the charge by means of a contact-making ampere-hour meter located on the truck. Such a section includes, for each circuit, a dial switch for the resistor; a meter reading switch; an indicating lamp; a double-pole, undercurrent and shunt-trip contactor with two auxiliary circuit contacts; a fuse mounted conveniently on the back of the board, and a resistor, also on the back of the board.

By means of the indicating lamp the operator can tell when the battery is connected to the section. The current is controlled and adjusted by turning the dial switch handle. Amperes and volts are read by the meter-reading switch in connection with a voltmeter and ammeter common to all circuits. Overcurrent protection is provided by the fuse, and protection against reversal is furnished by the undercurrent contactor. Automatic shut-down at the end of the charge is accomplished by the shunt trip device which is an integral part of the undercurrent circuit breaker, this circuit being energized from the line and completed through an ampere-hour meter mounted on the electric truck or locomotive.

"Portland Cement" Revised

The third edition of "Portland Cement," by Richard K. Meade, is now available. Originally this book was intended primarily for chemists and cement inspectors and described methods of test and analysis only. The section on the manufacture of cement has been increased with each edition, until in the third edition it is by far the largest part of the book.

In this third edition the author has thoroughly revised the entire text to make it conform to present day theory and practice. Much of the book has been rewritten. The subject matter has been increased by nearly two hundred pages, and most of this new material has to do with the manufacture of cement. The manufacture of cement is discussed in a very practical manner, and much information is given on the power and fuel requirements of the process, output of machines, cost data, etc.

A few new methods of analysis have been added to the section on "Analytical Methods," and the section on "Physical Testing." Some information as to the foreign specifications, methods of tests, etc., has also been added.

Sales of Crude Barytes Increased in 1925

Statistics compiled from reports made by domestic producers of barytes to the Bureau of Mines, Department of Commerce, show sales amounting to 228,063 short tons, valued at $1,703,097, in 1925—a gain of 16 per cent in quantity and 10½ per cent in value, as compared with 1924. While the total value of sales increased the average selling value, f.o.b. at mine, dropped from $7.85 to $7.47 a short ton. Missouri was the largest producer, shipping 44 per cent of the country's total output; Georgia ranked second, and Tennessee third.

Crude Barytes Sold by Producers in the United States, in 1924 and 1925

State	1924 Short tons	1924 Value	1925 Short tons	1925 Value
Georgia	71,776	$ 574,208	65,936	$ 475,618
Missouri	77,189	604,390	101,056	794,927
Tennessee	39,643	302,873	47,012	345,038
Other states*	7,724	59,273	14,059	87,514
	196,332	$1,540,744	228,063	$1,703,097

* 1924: Alabama, Nevada, North Carolina, South Carolina, Virginia, and Wisconsin; 1925: Arizona, Nevada, North Carolina, South Carolina, Virginia, and Wisconsin.

WILFORD POWER SHOVEL MAKING RAPID PROGRESS

The Wilford power shovel, using the Fordson as power was placed on the market this spring. The shovel is manufactured by the Universal Power Shovel Company of Highland Park, Michigan. William Ford, a brother of Henry Ford, is president. Its high mobility, rugged construction, speed and one-man operation make it ideal for the in-between job. It is meeting with the hearty approval of those engaged in road building, quarrying, contracting and excavating.

"Three weeks ago," said Frank Temple, treasurer of the Universal Power Shovel Company, "the Truck-Tractor Equipment Company of Columbus, Ohio, sold its first Wilford shovel. The shovel was put to work in a limestone quarry and its operation was a revelation to the many who saw it perform. The result of this single installation has been four additional orders which we are now shipping. We have increased production as rapidly as possible and expect to get up to two or three complete shovels a day before the end of this month."

Power for operating and propelling the shovel is derived from a Fordson tractor equipped with a governor. Every bearing is lubricated by the Alemite high pressure lubrication system. The motoris equipped with the special high compression head. The dipper is of plate construction with four manganese teeth. It has a capacity is of plate construction with four manganese teeth. It has a capacity of one quarter yard. The boom is of channel construction with two 6-inch members 13 feet long. The boom is raised and lowered by worm and worm gear, which are self locking and hold the boom at any desired angle. The dipper handle is of channel construction with two 5-inch members 8 feet long. The dipper handle socket is an electric steel casting provided with adjustment for dipper braces to change rake of dipper when desired. The mast is of channel construction with two 7-inch members fastened at lower end to swing circle casting and the upper end supports the mast head casting.

The revolving table consists of an electric steel casting on which are mounted all gears, drums and machinery for operating the shovel mechanism. It will swing three-quarters of a complete circle where automatic spring bumpers stop it. The crowding device is operated by a Ford one-ton truck worm gear which is reversed by two friction bevel pinions. The crowding drum is mounted on a worm gear shaft. There are no chipper shaft pinions, gears or brakes used with this arrangement. A singe cable operates the dipper handle up or down.

All shafts running 100 r.p.m. or more have Timken roller bearings. All other bearings are of highest grade babbitt or bronze bushings. All gears are forged from special high carbon steel. All shafting, pins, etc., are also made of special analysis high carbon steel. The clutches are positive acting and lined with Thermoid. The main clutch disconnects the tractor power from the shovel machinery either when the shovel is moving or when it is not operating. Hoist, crowding and swinging are operated by three hand levers and one foot pedal operates complete digging control. When used as a crane the Wilford shovel will easily lift loads up to 4,000 pounds.

The Wilford Power Shovel

All gears are drop forged from special high carbon steel cut and hardened. All shafting pins, etc., are also made of special analysis high carbon steel. The clutches are positive acting and are lined with special imported brake lining. The main clutch disconnects the tractor power from the shovel machinery either when the shovel is moving or when it is not operating. Hoist, crowding and swinging are operated by three end levers, while complete digging control is operated from a single foot peddle. When used as a crane, the Wilford Power Shovel will easily lift loads up to 3,500 pounds. The Wilford Shovel has several patented features which are proving their worth in the power shovel field for the first time. In addition, every authorized Ford dealer in the country is in a position to give service and order parts when necessary.

Coplay Cement Company Uses New Mill

The Coplay Cement Manufacturing Company, Coplay, recently placed in service a Polysius four-compartment tube mill, facilitating the manufacture of cement from the clinker to the finished product. It is the first of its kind to be used in this country. The machinery of the new unit in the Coplay Company's plant was made at Dessau, Germany, and its work is a matter of interest to the industry.

The tube mill is one of three to be erected by the Coplay Company. They comprise the main part of a plant improvement program which will cost approximately three-quarters of a million dollars. Change of electric equipment from 25 to 60 cycle, necessitating replacement of 140 electric motors, is another part of the program. The company's aim is to effect economies through efficient operation rather than to increase production.

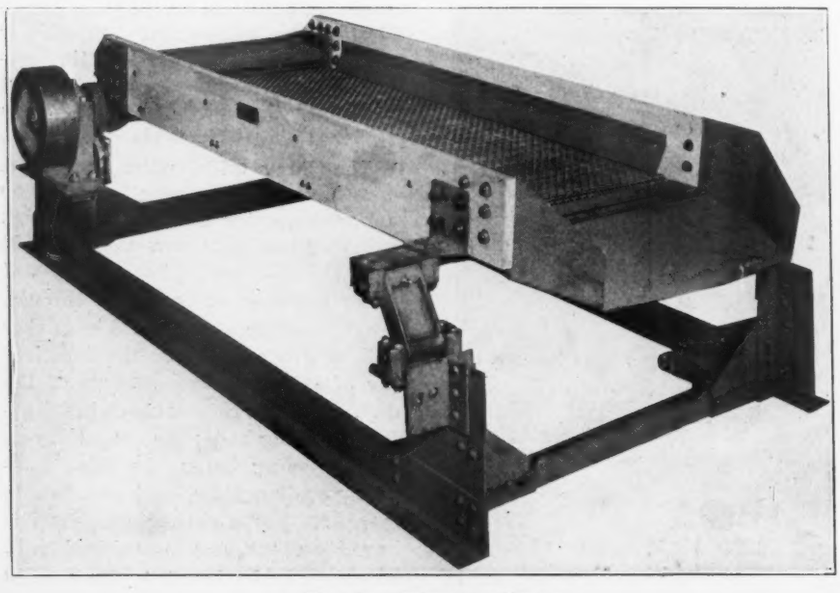
The three mills, when completed, will have an operating capacity 50 per cent greater than that of the 13 grinding machines now used in Mill C of the company's plant. They will effect economy of operation through lower power consumption. The clinker will be ground finer by the functioning of the four compartments of the mill. The first compartment has four-inch grinding balls; the second, three-inch grinding balls; the third two-inch grinding balls, and the fourth, cyl-pebs. Three clinker storage silos have been built, one to feed each mill. These silos have a capacity of 3,500 barrels.

THE NEW "ARMS" HORIZONTAL SCREEN

The "Arms" horizontal screen which is now being introduced to the crushed stone and sand and gravel industries embodies many interesting and important features. By means of the eccentric motion at the head or feed end and the link supports at the discharge end a combination vibratory and conveying action is obtained, making it possible to convey material horizontally or at the slight slope of two or three degrees. This of course means that a minimum of head room is required and in addition makes the perforations in the screen cloth 100 per cent available for screening instead of the vertical projections of openings which are inclined at 20 to 30 degrees.

The motion is obtained by ball bearing eccentrics which, in the case of the double screen, are set 180 degrees apart thus giving a balanced action and reducing external vibration to a minimum. Due to this eccentric motion, the vibration at the head is positive and is not limited by the reactive force of springs. In addition the whole cloth vibrates, there are no dead or inactive areas, nor is there any destructive flexing of the screen cloth. The eccentrics being located at the receiving end of the screen, produce the maximum agitation of the material at the point where it is most needed and assure an even distribution of the feed making it possible to secure unusually efficient screening.

The screen runs at about 500 r.p.m. and requires about 3 h.p. A specially designed ball bearing practically eliminates the danger of wearing due to fine dust. Alemite fittings are optional. The screen is self contained and is mounted on a rigid structural steel base, making installation a simple matter. It is manufactured in 3 and 4 foot widths and 6 foot lengths, however, the length may be optional up to 8 feet, depending upon requirements. The screen is adapted to the sizing of material smaller than about 3 inch and screening as fine as $\frac{1}{16}$ inch has been successfully performed.



The Arm Vibrating Screen

New Novo Engine

The Novo Engine Company has recently developed a new industrial gasoline engine known as the Novo U F which is designed to develop from 3 to 6 horse power. The engine is made with two cylinders using an opposed throw counterbalanced crank shaft, and is claimed to run with practically no vibration. This is owing to the construction of the crankshaft throws, each being fitted with a counter balance, eliminates unbalanced rotating masses. The pistons, the only reciprocating parts, one working downward as the other goes upward, also counterbalance each other. Power loss due to friction has been lessened as much as possible by the use of Timken tapered adjustable roller bearings which have been fitted to both the crank shaft and drive shaft. Splash system of lubrication is used, which functions even when the engine is tilted twenty degrees from the perpendicular. The power gears and bearings run in a bath of oil.

The engines are supplied either hopper or radiator cooled. For intermittent duty, the hopper cooled is used and may be furnished with or without steel house. Where the load is constant, the radiator cooled engine, furnished with steel house is recommended. Both types are equipped with Zenith carburetor, Splitdorf magneto, fly ball governor, fuel tank and cooling systems. They are also furnished with the drive on either side. The drive shaft is gear driven from the crank shaft through heat treated nickel chromium wide face gears. The carburetor, magneto, governor and other accessories are always placed on the side of the engine away from the machinery being operated.

Both types of engines are made with four drive shaft speeds, 400, 600, 1200 and 1800 r.p.m. The 400 r.p.m. gear combination drive with left hand or anti-clockwise direction of rotation of drive shaft. The 600 and 1200 r.p.m. gear combination is furnished with drive in either direction of rotation. The 1800 r.p.m. is supplied with the drive shaft running right hand or clockwise direction of rotation. The directions of rotation being taken when viewing the engine from the flywheel end. Both types of engine have the same crank shaft speed and direction of rotation, 12,000 r.p.m., right hand. All the Novo two cylinder engines crank right hand, which is the natural way to crank an engine. The floor space required is 20 inches square and the engine has an approximate height of 30 inches, and the weight of these units is about 350 pounds each.

Chicago Pneumatic Open New Branch Office

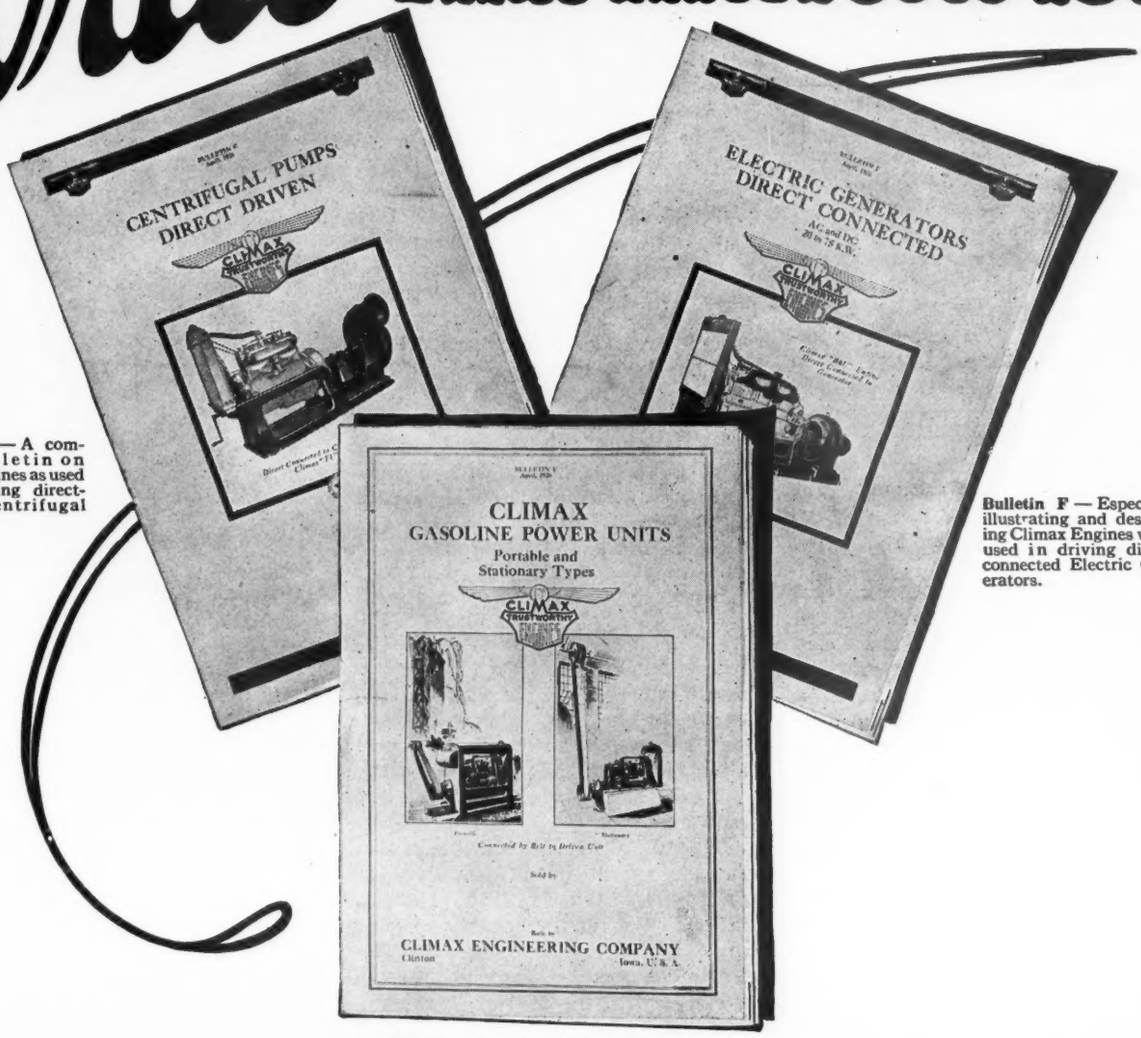
On October first the Chicago Pneumatic Tool Company will open their new building located in the central manufacturing district on Iron Street near Thirty-seventh Street, Chicago. This building is the new home of the Chicago sales and service branch and has been constructed for the benefit of the many customers who will now be able to receive even better service, with the new facilities of this building.

In order to assure customers of prompt deliveries this structure has been erected with a loading platform on the east side to accommodate the loading of two freight cars on the Chicago Junction Railway. It also has loading doors for trucks, and, in short, is designed with all necessary facilities to insure immediate service.

Being manufacturers of compressors, engines, complete lines of electric and pneumatic tools, vacuum pumps and all accessories in connection therewith, the company is now prepared to not only serve the Chicago customers but is able to maintain better service to the customers of adjacent branches.

This modern building is expected to be a useful asset to their business.

Write For The BULLETIN That Interests You



Bulletin G — A complete Bulletin on Climax Engines as used for operating direct-driven Centrifugal Pumps.

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Montreal, Que., Can.: Edward C. Dingman, 1005 Keefer Bldg.
St. Louis, Mo.: Tulley Equipment Co., 2339 Pine Street

Speeder Half Yard Shovels

The Speeder Machinery Corporation has recently issued Bulletin J 26 describing the Speeder half-yard shovels, cranes and draglines, Model B-1, which they manufacture. The engine, reversing mechanism and drums of this machine are mounted on a rigid bed-frame of 12 inch I beams. There are three steel drums, each 8 inches in diameter, with steel lagging to increase the diameter to 11 inches for extra line speed. Each drum is mounted on a separate shaft, bronze bushed and fitted with friction clutch and brake.

There are only one set of miter and one set of bevel gears on the machine. The change from traction to swing is accomplished through a sliding gear transmission and can be performed very quickly. In the entire machine there are only 17 gears. The machine is provided with high and low speeds which has proven very valuable in service. This applies to traction and the first two drums. The hoist drum has a constant speed, but line shaft may be varied by lagging the drums.

The power plant is a 40 h.p., 4x5 inch Hercules gasoline engine, located at the rear of the machine and easily accessible. The engine is provided with a Pierce governor to maintain steady speeds and a United air cleaner to remove dust from the air passing into the carburetor. The throttles and switch to operate the engine are near the operator's seat which is at the front of the machine thus affording an unobstructed view of the job.

The Speeder is converted from one type of excavator to another very easily with no change behind the boom hinges, by changing the boom and cables. The dipper arm shovel and pull shovel use the same boom; the only adjustment being to change dippers and arms. The crane boom attaches to the same hinges, and the drag-line uses the crane boom with the drag bucket cables reeved over the sheaves. The shovel crowd consists of one cable, anchored to dipper stick at either end and controlled by two drums on the machine revolving in reverse directions; cable pays from one drum to the other. One lever crowds in and out, the hoist line being independent. The truck which is of the crawler type comprises a frame rigidly made of structural members, braced and riveted. The truck frame proper is supported by four heavy steel H beams that extend across the underside and rest on the tread frames.

The crawler belts are made up of twenty-nine alloy steel treads each. These treads are 16 inches wide, hinged together with wide hinges and connected by 1⅛ inch steel pins. Each belt has a contact length of 8 feet on the ground and measures 10 feet 4 inches overall. The out to outside measurement of the treads are 8 feet 8 inches, providing a wide secure footing. Seven heavy steel trunnions on each side carry the weight of the Speeder and roll on the track laid as the belts turn over. Adjustment bolts at each end are provided to take up slack in crawlers and drive chains.

Some of the general specifications of the Speeder equipment are as follows: approximate working weight 24,000 pounds; shovel boom, length 16 feet; dipper stick, length 12 feet; dipper capacity ½ cubic yard; boom length 30 feet; clamshell, dragline or pull shovel bucket ½ cubic yard; hoist speed single line 126 f.p.m.; swinging speed 3 r.p.m.; working load, 12 foot radius, 7,000 pounds; working load, 30 foot radius, 2,800 pounds; turn table diameter 6 feet, travel speed high 1 m.p.h. and travel speed low 4/10 miles per hour. With a rated capacity of 300 to 800 cubic yards in a 10 hour day the approximate fuel consumption is 15 to 18 gallons.

McMyler Interstate Select New Distributors

The McMyler-Interstate Company, manufacturers of locomotive and crawler cranes, power shovels, clamshell buckets and special material handling equipment has appointed three new distributors in the west and southwest.

The W. H. Worden Company, San Francisco, will cover the states of California, Arizona and Nevada. C. F. Wolfradt, formerly Pacific coast branch manager for the McMyler-Interstate Company, became affiliated with the Worden Company, August 1. The Hofius Steel & Equipment Company, Seattle, has been appointed as distributor in the states of Washington, Oregon and Idaho. Thurman G. Frazee, First National Bank Bldg., Houston, Texas, will handle the McMyler-Interstate products in the state of Texas. Mr. Frazee, formerly associated with railroads, has for many years furnished equipment and supplies to the industrials and railroads of the Southwest.

Cleveland Products Expand

The Cleveland Wrought Products Company are now completing extensions to their plant number one. These additional facilities will enable the company to maintain on a high plane of efficiency the production of air hammer pistons and bushings, rivet sets, etc. The new facilities will also make it possible to increase the production in the cap and set screw division.

Gypsum Output for 1925 Largest Ever Recorded

The gypsum industry was highly productive in 1925, according to a statement made public by the Bureau of Mines, Department of Commerce, based on reports received from 62 operators in 19 states, and collected in cooperation with the Geological Surveys of Iowa, Kansas, Michigan, New York, Texas, Virginia, and Washington. The quantity of gypsum mined in 1925 was 5,678,302 short tons, which is the largest output ever recorded and exceeds that of 1924 by more than 600,000 tons, or nearly 13 per cent. The value of the sales of both crude and calcined gypsum was $47,893,573, an increase of more than $5,000,000, or 12 per cent, compared with 1924. Over 1,000,000 tons were sold crude and 4,104,735 tons were sold calcined. The value of the gypsum sold crude was $2,823,229, or $2.78 per ton, and the value of that sold calcined was $45,070,344, or $10.98 per ton. New York is the largest producer of gypsum. The production of crude gypsum in that state in 1925 was 1,730,254 short tons—30 per cent of the entire output—an increase of 17 per cent compared with 1924. It was also the largest seller of crude and calcined gypsum, 354,394 tons of the former (or 35 per cent of the total) and 1,193,520 tons of the latter (or 29 per cent of the total) being marketed in New York in 1925. These were considerable increases over 1924. Other important states in the production of crude gypsum were: Iowa, 800,167 tons; Michigan, 649,053 tons; Texas, 558,132 tons; and Ohio, 551,479 tons. These five states reported nearly 76 per cent of the total.

Crude and Calcined Gypsum Sold by Producers in the United States in 1925, by States

State	Number of plants reporting	Total quantity mined Short tons	Sold crude		Sold calcined		Total value
			Short tons	Value	Short tons	Value	
Iowa	7	800,167	140,451	$ 381,584	$ 562,210	$ 6,352,687	$ 6,734,271
Kansas	3	166,952	52,869	126,886	87,656	882,624	1,009,510
Michigan	5	649,053	155,961	391,093	477,076	5,056,201	5,447,294
Nevada	6	350,130	31,471	57,073	259,693	1,664,736	1,721,809
New York	10	1,730,254	354,394	1,017,403	1,193,520	15,518,836	16,536,239
Ohio	3	551,479	11,423	32,818	540,504	6,361,314	6,394,132
Oklahoma	4	320,931	53,286	122,666	232,660	2,476,797	2,599,463
Texas	6	558,132	28,396	69,487	426,710	3,652,467	3,721,954
Other states*	18	551,204	185,884	624,219	324,706	3,104,682	3,728,901
	62	5,678,302	1,014,135	$2,823,229	$4,104,735	$45,070,344	$47,893,573

* Arizona, California, Colorado, Montana, New Mexico, Oregon, South Dakota, Utah, Virginia, Washington, and Wyoming.

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"The truck driver also operates the Link-Belt Grizzly Loader, no shovelers are emyloyed in the pit.

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"The net savings on a day's production of 100-tons is $4.32. For 225 operating days the annual savings is $972.00. This is figured on basis of full depreciation within five years, though the loader should, I believe last much longer."

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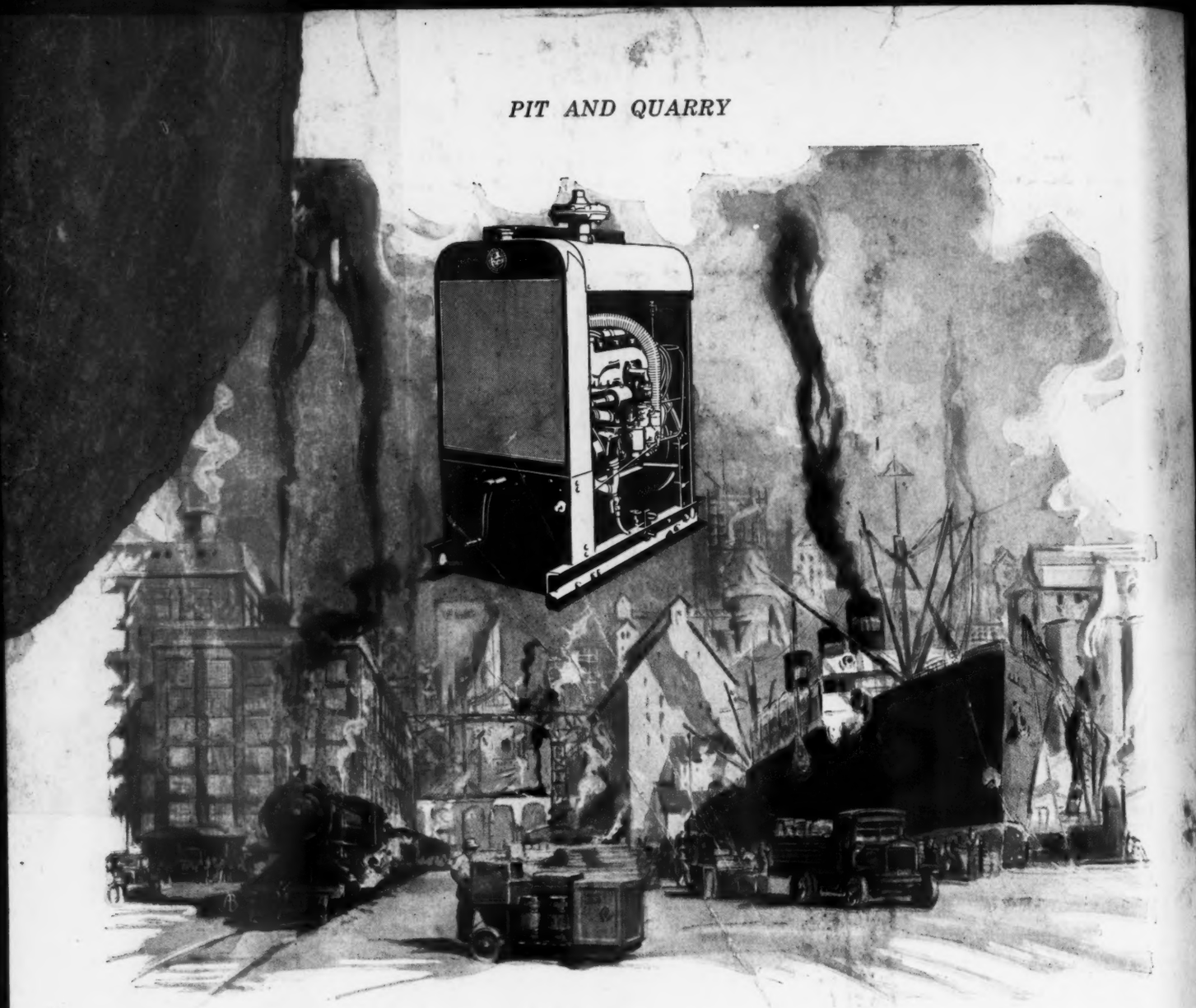

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